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## A FRATERNAL TOKEN FROM ACROSS THE SEA.

One of the most pleasing circumstances connected with the business of the gas maker is that evidenced by the feeling of kinship which binds the real working members of the profession, so to speak, in a joint brotherhood. The Yankee gas engineer, should his opportunity for travel enable him to compass the distance between the States and Tokio, for instance, having made himself known to his confrere at the last-named and distant spot, could feel assured of being greeted by a welcome "with feeling, not with fashion, softly freighted," and thus experience that contact of fellowship so refreshing to the sojourner, willing one though he be, in a foreign land. As it is in the Tokio instance, so also is it in quarters nearer home, and while gas men, of course, can and do appreciate fair skies and smooth waters, the roughnesses of adversity are powerless to disturb the serenity of their brotherhood and kinship. Thus preluding an instance which is submitted to prove the truth of that which we have set forth above, we herewith submit the salient points of a letter, the publication of which will reveal the spirit that prompted its composer:

"ROSEMONT FERRY ROAD, EDINBURGH, SCOTLAND, May 23, 1887.

"To the Editor AMERICAN GAS LIGHT JOURNAL:—Dear Sir—Will you kindly favor me by accepting the inclosed draft for five guineas, which I venture to send you, with the request that you will apply it to any of your Associations of Gas Managers, or in such other way as you may think best for promoting the objects of the American Gas Managers, whose interests you have so well represented for so many years. * * *

"It is some years since I went out of harness as a gas engineer, and it is fully 45 years since I first donned it in that capacity. I find that the last few years have left me far behind the advances that have been made, and I can only indicate by the inclosed my best acknowledgment of the teachings of your JOURNAL, which, I may tell you, I always enjoy. * * *

"If you please you need not mention my name, but in the place thereof perhaps the following *nom de plume* will do as well. Kindly let me know if this reaches you all right. Yours very truly,

"AN OLD SCOTTISH CONTRIBUTOR."

We believe that this unaffected and fraternal communication will be pleasant reading for our American fraternity, and we herewith, on their behalf, accept "An Old Scottish Contributor's" offering in the same spirit that caused him to forward it. To formally thank him now would not strengthen or illustrate our pleasure at his fraternal action, so we may pass on to say how we think it best to dispose of the guineas. Having consulted with some of those in authority in the executive management of the American Gas Light Association, it was thought best to offer the money remitted as a prize to be awarded to the author who contributed the best paper to be read at the forthcoming meeting of the American Gas Light Association. Further than this general disposition of the prize we feel it is not our province to explain, other than we presume that the officers of the Association will take upon themselves the duty of determining the way and means to secure a verdict in regard to which paper presented is best entitled to an award of the prize.

In connection with the matter of securing papers to be read at the coming meeting of the American Association perhaps no great harm will

arise did we call attention anew to the action taken in regard to the premises at the Philadelphia meeting, last October. Hitherto the Secretary has been solely burdened with the somewhat unpleasant and decidedly laborious task of importuning members for literary contributions, but hereafter, or until otherwise ordered at least, an entirely different method is to prevail. As the date for putting the new process in operation is really now at hand, we take occasion to reproduce the resolution commanding the new departure. That resolution is as follows:

"*Resolved*, That the Executive Committee be, and is hereby instructed to make a selection of, or designate not less than five members of this Association, who shall be requested, by said Executive Committee, to prepare papers upon subjects to be either selected or approved by the Committee; that the persons designated to prepare papers shall be notified of their selection, and of the subjects upon which they are expected to write, not less than 90 days before the date of the next annual meeting."

A reference to the intervening days shows that if the *spirit*, as well as the letter, of this resolution is to be carried out the Executive Committee have not much time for delay in instituting the preliminary steps necessary to insure a successful issue.

## EDITOR STONE AND THE GAS COMPANIES.

Editor Stone, who guides the New York *Journal of Commerce* in such deft and skillful manner amid the mazy paths of the pen and ink chronicles of the world's markets, must have a wicked partner, for when the real editor is not recounting the state of trade he is employed in coaxing to maturity and flower, either in sun-swept external garden bed or beneath the sheltering cover of the greenhouse, choice specimens of nature's plants and shrubs and vines. In view of his passion for that most peaceful of delights—the gardener's art—we cannot believe that Editor Stone would be wilfully unjust, therefore do we opine that it is to the pen of his wicked partner must be laid those fierce attacks upon the gas men that now and then inflame the otherwise placid columns of the *Journal of Commerce*. If the wicked partner is the one really responsible for the onslaughts—which, as a rule, often approach in dangerous proximity to truculency—we hope that his chief will seek to show him the error of his way. A correspondent in considering the attitude of the *Journal of Commerce* towards the local gas suppliers, calls attention to the following facts (if Editor Stone would *only* weigh them carefully), a perusal of which might even convert the wicked partner:

"The *Journal of Commerce* is now printed on paper that costs four cents per pound, whereas formerly its cost was nineteen cents per pound, nevertheless the subscription price of the aforesaid *Journal* remains the same. The par value of a share in the *Journal of Commerce* is $1,000; but these shares would now sell at $10,000. Would it not be well, at the next meeting of the Legislature, to introduce a bill that would provide for a compulsory reduction in the subscription price of the *Journal of Commerce*? RETEM."

Perhaps it would; it would certainly be beneficial to those merchants who peruse its columns every day. We fear, though, that Editor Stone and the wicked partner might scent an odor of communism in the proposition, and be prepared to stoutly resist such a diversion and division of the unearned increment.

## In Regard to the Distribution of Fuel Gas in Troy, N. Y.

During the time of greatest indignation aroused by the fuel gas disaster, that occurred in Troy, N. Y., on date of Jan. 16, on which occasion three persons lost their lives and many others were seriously prostrated, the Common Council, at a special session, suspended the fuel gas company's franchise, and subsequently appointed a special committee of five of their number, who were directed to inquire "into the condition of safety of the plant of the company, and to ascertain if the manufacture and distribution of non-illuminating fuel gas can be proceeded with within the city limits without endangering the health and lives of the inhabitants." That committee, having made an exhaustive investigation of the subject, recently presented to the Common Council the following report and recommendations:

"The Committee report that they have thoroughly investigated the matter, and find that to regulate the use of illuminating and fuel gas for the better protection of life and property, it will be necessary for your Board to adopt an ordinance setting forth, in unmistakable language, the city's requirements of parties engaged in the manufacture and distribution of illuminating and fuel gas. And your Committee would recommend the following as the substance of the proposed ordinance:

"SEC. 1. No person, company or corporation shall manufacture or have in this city, or deal in, keep, sell or give away, for illuminating or heating purposes, gas, except under the conditions hereinafter prescribed.

"(*a.*) The main pipes shall be laid at such depth as shall be directed by the board of health, not less than 3 feet from the surface, and shall be the best of iron pipe, with joints so arranged as to prevent leakage of gas; said mains, pipes and joints to be so laid as to stand a pressure of not less than five times the pressure under which the gas is to be delivered to consumers.

"(*b.*) All house connections, piping, fixtures and joints shall be so constructed as to stand a pressure of not less than five times the pressure under which the gas is to be delivered to consumers.

"(*c.*) No gas shall be put into the mains, pipes or house pipes until said mains, pipes or house pipes shall have first been properly inspected and tested and pronounced to be satisfactory by a person competent to make said inspections and tests.

"(*d.*) Whenever such mains or pipes or extension of mains or pipes, or house connections, or piping are to be laid, the company laying the same shall first notify the board of health, in order that its approval may be secured, of a competent person for thoroughly inspecting and testing the same, and the cost of such inspecting and testing, and all expenses connected therewith shall be defrayed by the company.

"SEC. 3. No gas of any kind, whether used for illuminating or heating purposes, shall be permitted in the city of Troy, unless it be so charged with a strong odorant that its slightest escape may be easily detected, and anyone manufacturing or dealing in such gas without such odorant as is herein prescribed, and without complying with the conditions laid down in sections one and two of this ordinance shall be subject to the suspension of all his or their franchise rights.

"Your Committee would also report that the State Board of Health has recommended the passage of a general law for the State similar to the above proposed ordinance." [Signed by the committee.]

The regulations are all very good, as far as they go; but it would seem as if the Trojans, after their midwinter experience, might reasonably demand still further protection.

## Rules for Testing Gas Fittings.

The London *Journal*, in commenting editorially upon the list of rules formulated by the Fire Marshal, of Pittsburgh, Pa. (that official having acted in the premises at the instigation of the local Board of Underwriters), to be observed in the piping of houses in which natural gas is to be employed for domestic purposes, thinks that these rules "may be usefully noted by inspectors of coal gas fittings at home." After that preliminary hint our contemporary says, "It is ordered that all fittings, before being used for gas, shall be inspected by an official, who is to be called in by the fitter to pass his work. All pipes must be tested by an air pump to a pressure of ten pounds, as indicated by a mercury column. All pipe ends are capped at first to allow the cocks to be tested, and then the caps are removed and the cocks tested for leakage. In case the pressure drops, a test with ether or with soapy water is ordered. No fire test is permitted under any circumstances. If a fitter should attempt to hide a leak, or to use cement for stopping a cracked pipe, his name is recorded in a black list for particular attention on a future occasion. It is necessary to be very careful in piping for natural gas, because it has but a very slight odor; and the safeguard, in the case of coal gas, is consequently removed.

"A vast amount of careless work in gas fitting is done in England because there is no inspection whatever in the majority of cases. It is, of course, open to an advocate of what is called Individualism to claim that, on the whole, there are not more explosions and fires due to faulty fittings where gas fitters are allowed a free hand than there are in towns where rigid inspection is the rule.

"The worst aspect of inspection systems unquestionably is the difficulty of insuring that rules are rigidly conformed to in all cases; and there is also the disadvantage that personal responsibility is divided between the inspector and the fitter, instead of being concentrated upon the latter. Human nature is not peculiar to gas fitters, moreover, and the average man, if he is treated as being unfit for responsibility, is prone to justify the suspicion; while with some workmen the temptation to try to circumvent an inspector whom they dislike is almost irresistible.

"This is a rather large subject, however, to be discussed on a point of rules for fire prevention. Regarded as regulations, these of the Pittsburgh Fire Marshal are decidedly reasonable and sufficient, without at all erring on the side of over-elaboration."

[Official Report.—Continued from page 348.]

## Tenth Annual Meeting of the Western Gas Association.

Held at St. Louis, Mo., May 11, 12 and 13, 1887.

### First Day—Morning Session—May 11.

*Concluding the Discussion on Mr. Egner's Paper.*

Mr. Howard—I heartily indorse the plan proposed by Mr. Egner. I believe it would be a good thing for the fraternity at large. Many questions of interest have not been definitely settled, and I believe that if such questions could be investigated by a body of men like those sure to be selected to govern the institute, their reports would be of lasting value. Take, for instance, the purification of gas; some prefer oxide to do the work, while others favor lime. If a competent authority investigated that matter thoroughly, the results could be relied upon by every company; and so it would be in other instances. As far as the defensive feature is concerned, I do not think that would be of much value, for if you take into consideration the present scale of consolidation going on, and thus realize the number of companies that are being either gobbled or bought up, you can readily see that in a few years not many companies will be at all interested in paying assessments to prevent raiding. I know in Iowa we are interested especially in that feature at the present time; but we calculate to fight the battle out on the right line, and expect to come out victors in the end. As my friend, Harbison, says, there are no secrets now in the gas profession; but I well remember when the greatest secrecy was observed. I remember the time when the engineer of a certain works prohibited a workman from examining a center seal that was about to be put up in the works. The workman asked if he could look it over before it was placed in position. "Oh, no," was the reply, "you cannot look at that; that is a great secret of mine." Now, however, a gas man is happiest when he can convey a bit of information to his brethren. I hope something will be done by this Association with regard to the proposed institute.

The President—I call upon Mr. Sherman, of New Haven, Conn., to speak to us on this subject.

Mr. Sherman—As I understand Mr. Egner's paper, he proposes to establish an institute which shall investigate new processes and appliances, and give to its members the benefit of that investigation—a plan which I most heartily favor. During my long years in the gas business I can recollect the failure of many a device. Were I to attempt, in my own experience, to recall all the failures made by me, and which have cost the companies I worked for many thousands of dollars, I would be appalled. If we could apply to such an institute for information in regard to any new process or invention brought before us, it would save our companies thousands of dollars each year. There is room for difference of opinion as to whether we should support each other in our efforts to break down and overthrow raiders; but I do not see how there can be any honest difference of opinion with regard to the merit of the point so ably brought out by Mr. Egner. It would save every company (particularly the small companies which cannot afford to make these experiments) a large sum of money. I have known young engineers to lose their positions because of their making experiments. If they had a source of information similar to that outlined, much money would have been saved, and the engineers would have saved their reputations. I fail to see where there could be any valid objection to that part of Mr. Egner's scheme, even though there might be objection to the part which proposes to grant assistance to those in trouble from raids. The first inception of the American Gas Light Association (in May, 1874) arose from that very purpose—to see if the companies would not stand by each other against raiders. The feeling was so bitter against the plan that the Association had like to be strangled in the hour of its birth. Whether such an arrangement would or would not be wise, I am not prepared to say; but my views with regard to the other suggestions of Mr. Egner are very firm.

Mr. Scofield—I heartily approve of carrying out this plan. The remarks of my friend Harbison rather amused me; to think that he must come here, away out in our Western wilds, to learn anything from these Western gas men! It rather pleased me to have him express himself in that way, because some of us do not think that we know very much, and we look constantly toward the East for information. But since the "star of empire" moves westward, our friend Harbison comes here; therefore we are happy to meet and welcome him, are glad to avail ourselves of his experience, and to partake of his knowledge. Asking to be excused for the digression, I may say that prior to listening to Mr. Egner's paper I had not known that this subject had been brought before any other Association, and it seemed to me a matter of much importance. Still, can such a plan be consummated? It would undoubtedly prove of great benefit to every little Western gas company, and often would be of equal benefit to the larger ones. Of course we are raided upon by the owners of almost every new patent, and if we could have the value of these new things satisfactorily determined by careful and proper test, made by competent experts in our own employ, much of our annoyance and loss would be permanently disposed of.

Mr. Watts—I think the institute would have plenty to do for many a day in investigating the different branches of our processes and machinery, as these are at present followed, without going into anything new.

Mr. Coverdale—As I understand it, this committee is ordered to report to morrow.

The President—Yes; on the plan to be adopted.

Mr. Coverdale—And I suppose that further discussion will be permitted when the report of the committee comes before the meeting.

The President—Of course, as I understand it, this committee will report to-morrow upon some plan to be adopted. That plan will then be referred to the other Associations, and if generally approved of by these other Associations, then a set method of action can be agreed upon for the establishment of the institute.

Mr. Thomas—I would like to further say that in my opinion this institute would supply much knowledge essential to the companies, and that it would be obtained most cheaply. By the way, our friend Harbison said that what we learn ought to be given freely. So it should be; but, nevertheless, what a man learns is a part of his capital, and he expects a dividend on it.

[At this point Mr. G. S. Page entered the room, and was invited by the President to give his views on the subject. The President and Mr. Egner explained briefly the substance of the paper that had given rise to the discussion, and also mentioned that the special committee in charge of the matter would report thereon on the following day. Mr. Page thereupon said he would reserve any expression about it until the report had been read.]

On motion of Mr. Cosgrove, a vote of thanks was passed to Mr. Egner.

### In Memoriam Resolutions.

Mr. Thompson, of Committee on Memorial Resolutions, read the following report:

Whereas, This Association having learned with deep regret of the death of our late associate, and first President, the late Mr. J. O. King, of Jacksonville, Ills.,

*Resolved*, That by the death of Mr. King this body has lost one of its most prominent and honored members; one to whom, more than to any other, we are indebted for the organization and subsequent prosperity of our Association. He was, in fact, the man to first conceive the formation of this Association, the consummation of which project is due principally to his efforts. His ability in his profession was recognized by us all, while his untiring activity in behalf of our Association, and the views held by him as expressed in our meetings, have impressed us with the sincerity of his aims in furthering the interests and promoting the objects of our organization.

*Resolved*, That by our intercourse with the deceased we learned to respect him for his ability, purity, and geniality; and,

*Resolved*, That his death deprived us of a man who was a credit to himself and an honor to the gas fraternity.

J. D. Thompson,
J. B. Howard, } Committee.
T. A. Cosgrove,

The resolutions were, on motion of Mr. Lansden, adopted by a rising vote, and ordered to be spread on the minutes of the Association.

A recess was now ordered.

### First Day—Afternoon Session.

Business was resumed at 2:30 p.m., by the election of the following named applicants for membership:

New Members Elected.

| | |
|---|---|
| Adams, C. F., Chicago, Ills. | Brown, E. C., Philadelphia, Pa. |
| Butterworth, W. C., Rockford, Ills. | Boardman, A. E., Macon, Ga. |
| Carver, W. L., Carthage, Mo. | Childs, J. C., Rome, Ga. |
| Castlen, W. A., Chicago, Ills. | Dunlap, H., Emporia, Kas. |
| Dickey, G. S., Chicago, Ills. | Frost, E. J., St. Paul, Minn. |
| Fishback, L. M., St. Louis, Mo. | Huston, J. N., Connersville, Ind. |
| Hill, J. D., Fort Scott, Kas. | Hopper, W. H., Philadelphia, Pa. |
| Hess, C. E., Jefferson City, Mo. | Leefers, J. H., Shelbyville, Ind. |
| McMillin, F. E., Neb. City, Neb. | Powell, A. W., St. Louis, Mo. |
| Ransom, N. A., Chicago, Ills. | Reynolds, B. S., Louisiana, Mo. |
| Rappleye, N. B., Chicago, Ills. | Rogers, E. D., Fort Wayne, Ind. |
| Steinwedell, Wm., Quincy, Ills. | Soden, W. T., Emporia, Kas. |

Shores, L. W., Kankakee, Ills.
Stratton, J. W., Valparaiso, Ind.
Tracy, Wm., Peru, Ind.
Woolen, A. L., Franklin, Ind.
Scott, H. C., St. Louis, Mo.
Stratton, S. S., Chicago, Ills.
Veal, E., Boonville, Mo.
Walsh, R. D., St. Louis, Mo.

### Appointment of Special Committees.

The President appointed the following special committees:

*Nominating Committee.*—Messrs. E. H. Jenkins, B. E. Chollar, J. Gimper, L. K. Scofield, and A. H. Barret.

*Committee on Place of Meeting.*—Messrs. T. A. Cosgrove, C. M. Keller, and G. H. Tayler.

### Report of Committee on President's Address.

Mr. E. McMillin, from Committee of reference on President's Address, read the following report:

Gentlemen:—Your Committee appointed to take into consideration the President's Address, and to report to this Society such suggestions as they may think should be further considered by you, respectfully submit that in their opinion the address is sufficiently clear and explicit to need no further elucidation by the Committee.

Your Committee suggest that it would be well for the members to carefully read the address, when published in the regular proceedings, and profit by the thoughts suggested.

There is one assertion, however, in the address that your Committee believe the Association would be interested in having further discussed, which is, that it costs more to enrich natural gas than to make coal gas.

The President very forcibly calls attention to the benefits that grow out of this Association, and this leads your Committee to suggest to the members that additional benefits may be derived from State organizations of a similar character.

Your Committee also suggest that this Association put itself on record as believing that the time is rapidly approaching when State Gas Commissions will be found beneficial both to gas companies and their patrons.

Respectfully submitted,
E. McMillin,
J. B. Howard,
E. J. King,
} Committee.

Ordered to be placed on file.

### Report of Directors on Application to Report the Proceedings.

The Board of Directors, to whom was referred the application* of Mr. G. W. Graeff, Jr., reported that "We recommend that the American Gas Light Journal be continued as the official organ of the Western Gas Association, and such other journals as may desire to print the proceedings be accorded that facility for taking stenographic or other notes of all proceedings and papers that would not interfere with the business of the Association."

The report was discussed at some length, and before the question on its adoption was put, the President, in explanation, said that the report retained the American Gas Light Journal in its position as the Association's official organ, and in which the proceedings are to be regularly published, in respect to papers, discussions, etc. In answer to a question for a further construction of the report, President Fullagar said:

"I rule that whatever papers are read before the Association be turned over by the Secretary to the American Gas Light Journal. If members wish to give copies of their papers to other journals, that is the affair of the authors."

The report was adopted.

### Reading the Papers.

The following paper, by Mr. J. Gimper, of Leavenworth, Kansas, on

## THE DISTILLATION OF COAL,

was now read:

Cheaper gas has been the constant cry during all my experience in gas making, and this cry has met with a corresponding response. The gas man has not remained idle, for he has made improvements in almost all of the different departments; but in no other one has so much progress been made as in that part where some kind of regenerative system of firing has been adopted. Admitting that progress in the instance specified, I am of the opinion that much more can be accomplished by the proper distillation of the coal, for our present mode of distilling the coal is about the same as it has been from the beginning of the history of gas making. Let us look at it for a few moments carefully in order to see what we are doing.

We introduce solid coal into a highly heated retort, and while we thus volatilize a portion of it, yet another portion is but partially volatilized, although, in the very next moment, we commence to condense it again. This was most forcibly illustrated to me by a mouthpiece in one of our benches which had a crack in its bottom. One day, after charging said retort, I noticed, in less than five minutes after closing the lid, a small stream of water running from the crack, which, continuing for some time, conclusively showed what a strong condenser the mouthpiece and stand-pipe is. Choked stand-pipes are also a further clear indication of this fact.

These are, to my mind, erroneous conditions. We should not commence condensation at the end of the retort. We should continue and prolong the distillation until all the semi-volatilized parts, or tar, have also been fully converted into a permanent gas. In other words, we should produce gas and coke only, and make no tar. That this can be done none of you can deny. The only question is, "Is it practical; and will it pay?" In answer to both portions of the question I would say that I firmly believe it is practical, and hence can be made to pay. In fact, when so done, the question of dollar gas will have been solved.

In order to accomplish such results we must inclose our mouthpieces, or have none at all; also the stand-pipes should be protected, the volatilized products of the coal should be passed through heated retorts, or chambers, where all the tar would become fixed into permanent gas, and thence led to the hydraulic main. As a result of this practice, I believe, we would secure a gain of from 1 to 1½ cubic feet of gas per pound of coal carbonized.

Those heated retorts or chambers might form a part of the arch, and need not be exposed to the highest heats in the arch.

To convince myself of the correctness of this line of thought I have made some experiments—the apparatus for which, however, while not purposely constructed for the end suggested, nevertheless served or answered to prove the possibility of easy conversion of all the tar into gas.

I had three through retorts which were connected with each other, and set one over the other. All the retorts were provided with sight-cocks. The lower retort was charged with coal, and observations made on all the retorts, which showed the following conditions. The lower retort remained clear to sight for ten minutes, looking from the back end of the charge towards the first rising pipe; the middle and top retorts darkened at once, with a dense smoke. On allowing this smoke to escape it was noticed that it possessed a bluish tinge, and quite unlike the yellowish brown (and thick) color so well known to you all. When this smoke was allowed to impinge against a colder object moisture and fine carbon would be deposited upon the surface, but no tar.

This condition continued for 45 minutes, regularly, during each trial, after which the gas would become dry, and no moisture could be detected. During all this time the retorts would have a dark or even blackish appearance, but as soon as the moisture had disappeared the interior of the retort began to show brighter, which brightness increased with every 10 to 15 minutes, until we could nearly see from end to end of retort. When the gas was allowed to escape it appeared as a blue smoke, and when in contact with a colder body would deposit only finely divided dry carbon, but no tar. When a pipe was introduced into the retort a like condition would be observed upon withdrawing it; it was absolutely free from any tar. The retorts were connected with a separate hydraulic main, and the tar-pipe leading from it was conducted to an open barrel, so that all the condensation from it could be observed; but no tar was visible during any of the trials. With remarkable regularity the 45 minutes were observed, during all the trials, for driving out the moisture. After one hour 30 minutes, to one hour 45 minutes, all the gas worth anything would be taken off. Hardly any smoke was then visible upon opening a sight-cock.

My apparatus beyond the hydraulic main was so connected that I could not measure or separate the gas to know its quality or quantity; but upon lighting it I could observe that it was fully as good as other gas extracted from the same coal under ordinary conditions. In fact, I believe, that with the proper sort of construction, a yield of from 6 to 6½ feet of gas per pound of coal can be obtained.

### *Discussion.*

Mr. Howard—I was very much interested while listening to Mr. Gimper's paper. While not conversant at the time with the process or measures taken to gain the present results reported by Mr. Gimper, I do know that similar experiments were made, at a cost of several thousand dollars, too, in the Citizens gas works, at Brooklyn, N. Y., some 20 odd years ago, whose managers then thought they could not only volatilize the tar, but everything else as well, or to the complete volatilization of all the residuals. After repeated efforts, extending through a trial of two or three months, they failed to obtain the anticipated results, and abandoned the project. I think some of the older gas men here will remember the process, which was, I believe, known as the Elmer process.

*Ante, p. 344.

The President—Was not that the Gwynne-Harris process?

Mr. Howard—No; it was the Elmer. I visited the Citizens' works at the time the experiments were being made. The plan, however, was a failure. I am proud to think that one of our Western men has achieved that result, although only in an experimental way. Nevertheless the success of the experiment leads me to believe that an equal or superior effect will be gained further on in a practical manner.

Mr. Egner—I believe I can eclipse Mr. Gimper's 6½ feet claim, for I have made 8 feet to the pound (having 14½-candle power) out of a coking coal mined in Washington county, Indiana. I tried that coal in another experimental apparatus, and got 8 feet of a splendid gas, but in 10 hours it "fixed up" my exhauster to the degree that I could not get it to pass one cubic foot. I had to take that exhauster down and "chisel" it out; then I went to work again and secured a yield of 8 feet once more. I believe that more gas can be gotten out of the coal, and believe that enough light oils can be converted into gas to do what Mr. Gimper claims.

Mr. Lansden—I suppose this question relates to the same thing that I have been working on for several years past. It always puzzled me to know why it was that in the first hour or so of a charge I got 20 or 22 candle power gas from the retort, while at the end of 4 hours the candle power was down to 10 or 11. I always believed that the material in the interior of a lump of coal was just as good for gas making as the outside, and always understood that the tar contained a large quantity of valuable illuminants. A few years ago I made an experiment and secured results which beat Mr. Egner's all to pieces. I employed an upright retort, and fed pulverized coal into it, consequently the gas as it was generated passed through no incandescent carbon. I actually got 12 cubic feet of 16-candle gas to the pound of pulverized material. To make my meaning clear in this case: Suppose my hat to be a lump of coal; from the outside of it, early in the burning off, I get 20 to 22-candle gas; when the charge has worked for 1 to 1½ hours the candle power is down to 18, and finally this value lowers so that when the gas given out from the center of the lump is received it has a value of but 10 or 11 candles. Now, if you break that chunk of coal open you will find that there is just as good gas in its center as there was in its outside crust. I claim that the defect of our present system of carbonizing is this: As the outside of the lump of coal becomes incandescent, the rich gas passing from the center passes through this incandescent crust and carbon is deposited, while the hydrogen passes on through. Therefore, if we can carbonize the center of the coal without obliging the gas to pass through an incandescent crust, I believe that we might get 12 feet to the pound.

Mr. Gimper—In my paper I meant to point out more particularly the error that we commit in condensing too soon after we make the gas, and did not intend to lay so much stress on the great quantity of gas that we obtain per pound. I obtained my yield of 6½ feet to the pound from poor coal—not from such coal as most of you are accustomed to working with, and I might even have beaten Mr. Egner had I used a better grade; but as I am using a "nutty" coal my figures, of course, were based upon the materials I employed. It seems to me to be an error to condense immediately after making the gas. I have been troubled a great deal (when running very high heats) with tar, and I thought if I could get rid of the tar entirely—in fact make gas of it—it would be of great advantage. I tried to reach that result, and was very much interested in the trials. I could watch and see everything going on in the retorts as long as they were dry; but as soon as any moisture came from the coal the vista became absolutely dark. As soon as it began to dry again I could see the results clearly. I could not find a trace of tar anywhere. My object principally was to be delivered from the tar, and my effort was to stop condensation as soon as it could be done. That is what we are doing at Leavenworth to-day.

Mr. Watts—I would like to ask the average size of the particles of coal that Mr. Gimper is (and Mr. Lansden says he was) using so that we may be able to compare and determine whether the results tally. Mr. Gimper may have used either half or double the size of coal that Mr. Lansden employed.

Mr. Gimper—The coal that I used, as to the size of the pieces, was quite small.

Mr. McMillin—How big are the retorts?

Mr. Gimper—My experimental retorts are small (12 inches in diameter) and carbonize only 100 pounds at a charge.

Mr. Lansden—I fed the coal into the retorts by means of a screw carrier—the coal was powdered perfectly thin and fine—or as fine as I could powder it—and the gas was generated immediately as the material fell from the top to the bottom of the upright retort. The exhauster placed at the bottom was worked under a tenth of an inch vacuum. I also fed in some steam through the coke fire that heated the retort. The question to be settled among ourselves is whether the internal portion of a lump of coal does not contain just as good gas as that from the crust; and whether the coal you are working, after three hours of roasting, is not just as good and rich in candle power as that from which the gas has been extracted in the first hours of the charge.

The President—I suppose if you were to use slack coal you would have the same benefit.

Mr. Lansden—No; it would run together then and coke. It will coke if allowed to remain at rest. It must be kept in motion all the time, and worked on the principle that I mentioned. It must not lie idle in the retort at all.

The President—I suppose some of those present remember that in Yonkers, N. Y., about six years ago, an inventor had a patent bench (three retorts on a side) for carrying out this plan of no mouthpiece condensation. There was only one mouthpiece, which was placed on the upper retort, to carry off the gas. The gas passed up from the bottom and came forward and out at the front. They got no great results from it, but did manage to make a great quantity of lampblack in every retort. The same thing will take place in a 20-foot in length through retort, for in case you charge one side of it and not the other in a few moments it will, from mouthpiece back, be covered with lampblack.

Mr. Thomas—Mr. Howard spoke about the Elmer process for using up the tar, but did not say anything about another New Yorker who also attempted to accomplish that object. The latter devised what might be called a double-decked retort—one retort being placed over another—and the thing was brought to such a stage of perfection that it at last became dangerous for the workmen to operate them, the supposition being that the men would be drawn in and gassified if they came too near the double-decker's front. I do not know whether they made 8 feet to the pound or not, but I do know that they had neither tar nor coke, and that it was dangerous, as I have said, for a man to get in front of the bench. After they had been operating for three or four months the mains, rather suddenly it seemed, began to leak, whereupon it was urged that the mains were very faulty. When asked why the mains did not leak when they were first tried the experimenters thought they had better take a few notes in regard to the situation. They claimed to be making from 7 to 8 cubic feet of gas out of every pound of coal put into the retorts, but the consumers' meter returns showed that there was a loss, as between production and consumption, of over 50 per cent. I was called in consultation by them, and my advice to them was to drop the double-decker, and that if they did so the mains would likely tighten up again. The counsel was followed out, and since then they have had coke and tar—and gas.

Mr. McMillin—I hope the members of the Association will not blame the tar entirely for the poor yield that most of them get. Mr. Lansden's statement gave us 12 feet to the pound. That is certainly 7 feet above the average, or 14,000 feet extra to the ton. That 14,000 feet would weigh between 500 and 600 pounds; but as the tar would only weigh something like 25 pounds, it cannot be held responsible for all of it. I think most of it came from the coke, if it did not come from the jet of steam which he introduced at the bottom—which is altogether probable. He was making water gas then, and did not know it. I am of the opinion that we do not get near the amount of gas from a ton of coal that we ought to get. I think that before five years have passed there will be as many gas men making 5½ feet to the pound as there are now who make but 5 feet. I think that Mr. Egner is on the right road. If he makes a mistake he will go back and start over again, and will probably blaze out the way for the rest of us to follow. This gain in gas does not, of course, come from the tar, for the tar in a ton of coal is too small to make all this gas; and I would not convert my tar into gas if I could. I can buy coal cheaper than I can buy coal tar. There are men who are getting more for their coal tar than the coal costs me; and, therefore, I do not want to make my coal tar into gas. If I can buy coal at $2 per ton and sell my tar for $2 per barrel, I will continue to make some tar. However, the extra yield, I take it, cames not from the tar, but from being able to volatilize more of the coal. I think that with proper facilities (I do not pretend to suggest what those proper facilities are) we will be able to volatilize about one-half of the coke left in the retort. There is hydrogen enough in the coal to make heavy and light carburetted hydrogen. We do not take that away; we decompose it. I think the sulphur color that we find on the coke in an extra hot retort is due to the graphite thrown down by decomposition from matter which, first becoming gasified, is afterward solidified from coming in contact with hot carbon. In my opinion Messrs. Gimper and Lansden are right in their statements. We do not want it to come in contact with that if we can avoid it; and I think it is possible to avoid it. I tried to demonstrate that sometime last

winter, in a letter to the AMERICAN GAS LIGHT JOURNAL,* by showing that it was possible to make a better gas when securing 5½ feet to the pound than when making 5.10. I believe that such a thing is possible, and that in doing it you might not get as much naphthaline as you do when making 5.10 or 5.25. I have, for some days at a time, run our heats up to where we got 5.45, and occasionally 5.50, and absolutely increased the candle power—I will not tell you how much, although I am almost tempted to do so after hearing these men tell their stories. But it is a fact that a decomposition may occur there that will form heavier hydrocarbons, which they do when you make naphthaline, and is just exactly what occurs probably by the decomposition of marsh gas. Now, there is a heavier hydrocarbon that forms, but you cannot keep it gaseous, and, therefore, the quality of your gas is reduced instead of being benefited—although the quantity is increased—because you have more hydrogen in combination with carbon. If you break that up it is possible to double your volume. If you form the right kind of hydrocarbons, then it is possible to keep them gaseous. Just what temperature will do that I will not undertake to say; but I say that there is a point where you can make 5½ feet of gas out of a pound of coal in ordinary clay retorts, and make it of an illuminating value in excess of 18 candles.

Mr. Lansden—I do not want it understood that I got this extra yield from coal tar. There is where I got my candle power from.

Mr. Howard—With the assistance of the water.

Mr. Lansden—I got 12 feet without the water gas.

The President—Did you ever try to distill coal tar by itself to produce gas, and then determine what candle power you got from it.

Mr. Lansden—No.

The President—Then try it sometime, and see what candle power you get from it.

Mr. Lansden—We manage to leave a lot of heavy oils, benzoles, etc., in our coal tar, and these I think ought to be valuable for enriching purposes.

Mr. Boardman—Having an idea that there was some valuable enricher in the coal tar, and as all kinds of enriching material cost us a good deal in the South, I thought I would try an experiment with it; but instead of putting the heavy tar that came out of my hydraulic back into the retort, I thought I would take those lighter tars that came over and were occasionally deposited in some of the drips not far from the exhauster—I carry the gas through quite a length of main before it reaches the exhauster. I used that light tar in lieu of an enriching oil, but I could not find that I got anything out of it. I do not know that it increased the yield perceptibly, and it certainly did not increase the candle power enough to warrant me it carrying it on.

Mr. Lansden—The reason that you got no benefit from it was that you had no hydrogen to pick it up.

Mr. Boardman—The light oils in the tar being hydrocarbons themselves, I thought by breaking them up I would probably get some little illuminant from them.

Mr. Lansden—You must have hydrogen beyond what is needed in your gases in carbonization to hold these illuminants in suspension.

Mr. Boardman—I do not think that is necessary. I use crude oil, which is a hydrocarbon, in the same way, and the light tar, having very little more specific gravity, should act in a measure like the crude oil; but I found that it did not.

The President—Perhaps some of the gentlemen present remember the original Gwynne process, in which hydrogen gas was passed through the retorts to take up the tar. He secured a yield of six feet per pound of coal, and had no tar. I believe the process, at least as tried in Elizabeth, N. J., was not a great success.

Mr. Lansden—But that was an artificial combination entirely. It is the natural hydrogen combination that I spoke about.

The President—Brother Page, having been in the coal tar business, for a lifetime, can tell us how much gas we can get out of a gallon of tar, and is also an authority on the value of "light" and "dead" oils.

Mr. Page—If the question referred to the residual products to be obtained from the distillation of the tar I could answer it. So far as I have read in foreign and American journals I do not think that anything great has ever been accomplished in attempting to make gas from coal tar.

Mr. McMillin—How much benzole do you obtain from the tar per ton of coal carbonized?

Mr. Page—About one-quarter of a gallon. Where regenerative furnaces are used no benzole is obtained. The tar made at one of the Boston (Mass.) gas works is almost valueless, because of its lack of carbon. At many points where excessively high heats are carried on the tar distiller fails to find any of the light products—not even naphtha.

* See JOURNAL, Jan. 8, 1887, p. 13.

Mr. Gimper—We sell all our tar to one party, but we have two wells, one of which holds the tar from the hydraulic main, while the other holds that from the condenser and scrubber. From the latter—it is a large well—we had not taken any tar (since 1882 or 1883) until quite recently, and the party who purchased it said it was of much better quality than that which came from the other storage well. That corroborates what Mr. Page has said. I never intended to advance the idea that condensed tar could be profitably used in making gas. My idea simply was that the distillation might be continued under certain conditions of heat, etc.

The President—At what temperature do you think it ought to leave the retort, passing through the stand-pipe? Did it get up to about 700°?

Mr. Gimper—I hardly think so; but I do know that the heat increased at once.

The President—You will not have much condensation at less than 700°. Instead of condensation you have a drying up of the particles, which, clinging to the stand-pipes, cause the latter to become clogged. If you hold a piece of paper in front of the mouthpiece you can ordinarily burn it by means of the issuing gas. There cannot be much condensation there under those circumstances.

Mr. Gimper—In the retort I mentioned as having a flat mouthpiece we carried a high heat. I do not believe that this moisture is condensed at once in the mouthpiece of the stand-pipe, even at a high heat.

The President—I would like to find moisture on my mouthpieces when I open them. I would be satisfied then that I would have no trouble.

Mr. McMillin—The temperature in the stand-pipe is, of course, too high for the watery vapor to condense unless a current of cold air is going in there. The temperature of the gases cannot be extraordinarily high unless when working under a very considerable pressure. With but very little above the atmospheric pressure you would not get a very high temperature from the steam in there. It is surprising, when you come to figure on it, how much steam is generated from your coal, even from the finest of it. We sometimes use coal in Columbus that will generate nearly as many feet of steam as of gas. In the Columbus experimental works where we catch the water, tar and gas, and separate all of them, we often find that the water will weigh as much as the gas. We reduce the heats very rapidly, but I would not expect that watery vapor to condense before it reached the hydraulic main, not extensively at any rate. Possibly some condensation might take place if the stand-pipes were not very hot.

Mr. Pratt—Perhaps heat theories are correctly based, but there is so wide a diversity in the range of temperature between the time you charge your retorts and draw out your coke that we must look for a pronounced variation both in regard to quantity and illuminating power of the gases obtained. When the charge is first put into the retort the inside of that retort must necessarily be cooled somewhat, and the temperature be reduced; but it then gradually increases until the vessel and its contents are at a high heat once more. As has been said, when the outside of the coal mass gets too hot the vapors cannot pass through that crust without being destroyed. That would leave your hydrogen almost free, but necessarily you would have a poorer gas. I would like to see these papers go a little further. The company that I am employed by, and perhaps it is so with the most of you, do not care whether their coal yields 5, 5½ or 6 feet to the pound, but they do care for the practice which will return the largest dividend. Now, can you secure the latter by keeping your yield up to the maximum point? If you cannot you do not want it, but if you can you do want it. I have tried a great many times to get a big yield; but when I came to figure up at the end of the month as to how I got that yield, I would find out that I got it at the expense of my coke, or of my labor account, or something else; then did I drop back a trifle, or be satisfied with a lower yield, I managed to secure some compensating return which more than recouped the extra yield—for instance, the gas would have a better illuminating power.

On motion of Mr. McMillin, the thanks of the Association were voted to Mr. Gimper for his paper.

The President—I would like to call the attention of the Association to the fact that the great fault of most of our members, and particularly of the younger ones, is that they seem to think that a paper should cover several sheets of paper; but if they prepared a paper of ten or twelve lines in length it would answer just as well for the purpose of discussion as a longer one.

### GAS FROM LIME STONE.

Mr. Egner—Instead of a paper I will relate an experiment that I once made and which may interest you all. It was an effort to make gas out of the stones that are used here for building, or such as the streets of St. Louis are paved with. I actually made gas out of building stone. I

have taken ordinary quarry stone, broken up in fine pieces, to the Laclede gas works and made gas therefrom. I led two pipes (1 inch in diameter, and 30 inches long) from a small furnace into the retort. One of the pipes contained the broken stone, the other pipe being filled with charcoal. They were connected at the back. I then rigged up an arrangement which, for convenience, I will say was a hydraulic main; I filled that with a quantity of poor oil—oil distilled from coal tar. Then I heated the whole thing up, and got from it an illuminating gas. The theory is about like this. Limestone contains a certain quantity (I obtained 1,600 feet from a ton of the stone) of carbonic acid gas, and the latter can be expelled by heat, and when my apparatus extracted the gas from the broken stone the gas was passed on through the charcoal—the latter being heated to redness—where it was, I suppose, converted into carbonic oxide, which, on being passed through the oil, took up illuminants from the oil sufficient to cause the "finished" gas to burn with a quite bright flame. That experiment, however, is not likely to prove very profitable. I also made gas out of limestone by putting it in a vat of water diluted with sulphuric acid, and obtained carbonic acid gas after the manner of the mineral water manufacturers. Then I converted the gas into carbonic oxide by passing it through retorts filled with charcoal, and then carburetted it by passing it through naphtha, and also through tar oil. It had a very fair illuminating power.

Mr. McMillin—It does me good to be able to beat Egner in something. He said he only got 1,600 cu. ft. to the ton of stone, whereas I have made nearly 15,000 cu. ft. from a ton of the limestone material!

Mr. Egner—Did I say 1,600? I meant 16,000.

Mr. McMillin—There are no "second chances" allowed here. For convenience, let us place the weight of the ton at 2,000 lbs., and if we had a pure limestone it would contain 44 per cent. (880 lbs.) of carbonic acid. As 8½ cu. ft. of carbonic acid gas equal 1 lb., it follows that the ton contains about 7,500 cu. ft. of the gas. For every foot of carbonic acid gas passed through incandescent coke you would obtain 2 cu. ft. of carbonic oxide, and by the time you had enriched the product you would easily have secured a total of 15,000 cu. ft. I supplied that sort of gas to a certain town, on two consecutive nights, some 15 or 20 years ago, and supposed I had found a bonanza. I did not know at that time how dangerous carbonic oxide was, and I had not been taught as much about water gas then as I have since learned. It could not be made very rapidly, because you cannot coke stone quite as fast as you can Pittsburgh coal. The experiment was made in a way very similar to the one described by Mr. Egner. In a bench of threes, carbonic acid was taken out in the first retort and passed into a 2-inch pipe (run into the back end of the second retort) filled with coke. Going forward it passed through the coke, was decomposed, and then passed through the third retort, where the enriching oils were placed. I got nearly 15,000 cu. ft. to the ton of stone. Of course we could make the gas as rich or poor as we desired, by using much or little of the enriching material. You can make a good gas in that way. Of course it is heavy, and you would require good sized mains, in order to crowd enough through. Originally I put up an experimental works in which the retorts were 4 feet long and 8 inches in diameter, and carried on the experiment with them until I thought I had solved the problem in a satisfactory manner. Then I branched out on a larger scale. I invited a friend to inspect the operation of the small works, which had been idle for a few hours prior to his visit—the purifying apparatus, washers, scrubbers, and everything of that kind being contained in one vessel. After starting the thing in operation and running it about long enough, as I supposed, to work off all the air, I opened the top and touched a match to it, whereupon some of the things went to the roof, and some of them did not. That so frightened the workmen that I could not afterward get them to operate the process on a large scale. I was then engaged also in the iron manufacturing business, and, while studying up some problem involved in the production of pig iron, got hold of a work (then recently published) by a German author, in reading which I discovered that my limestone operation was far from being new. The author referred to had, it appeared, years before suggested the same principle for manufacturing carbonic oxide for metallurgical purposes. I have now a paper among my literary accumulations (I read it before a scientific society 14 years ago) on that subject, and I assure you it is a very interesting one.

Mr. Watts—I think that Messrs. McMillin and Egner are about even. Mr. Egner made about 1,000 cu. ft. more gas to the ton, but he neglected the very important matter of telling us how many pounds of coke he got to the ton of rock.

Mr. McMillin—That is a matter of calculation. You could very easily see, when you break up the carbonic oxide, how much coke that operation would take. Each foot of carbonic oxide would be a little more than one-third the weight of the carbon which would come from the coke. My recollection is that it was about 300 or 350 lbs. The quantity of coke required to decompose the carbonic acid was small; but the quantity required to coke the limestone was very large.

The President—How about the residuals?

Mr. McMillin—The residuals were very poor.

Mr. Boardman—The use of limestone in making gas reminds me of quite a successful operation of that kind carried on now in New York city by the managers of the Equitable Company. Through listening to this discussion I am inspired to say that, while Messrs. Egner and McMillin got carbonic oxide by decomposing limestone, the Equitable folks manufacture their carbonic oxide under the ordinary water gas system; therefore the latter might obtain a wrinkle from the former, and save money. (Laughter.) I shall propose to them now to make their carbonic oxide as these gentlemen did. There is another waste that they allow to creep in—an item which can be utilized very nicely. The quicklime left after the gas is made could be utilized in their purifiers.

Mr. McMillin—You cannot lay claim to that inspiration, either. Both Egner and myself tried that.

Mr. Boardman—I do not want every man in this house to claim it. At any rate, I was the first one who said it.

Mr. Jenkins—I think Mr. McMillin forgot to mention another instance which goes to show that the making of gas from stone is nothing new. They have a stone in parts of Indiana and Ohio from which they get gas; and all they have to do is to drill a hole through the rock, when they get all the gas they want.

Mr. McMillin—I was about to add that on looking over this paper that I read some time ago I found a few foot notes (they were not read at the time) proving that the cost of the limestone was about $1 per ton, and at the same date I could get about $2.50 for the burned lime; therefore I might give the gas away and still make $1.50 per ton by the operation.

### Assigning Subjects for Papers.

Mr. King—At the last or Columbus meeting of our Convention I was bold enough to make a motion, but it did not receive especial favor from the members. Now, although I may not renew that motion at the present time, I will ask Brother McMillin to tell us about the workings of the rule under which members are assigned subjects whereon to prepare papers to be read at the meetings of the Ohio Association. I think the fact that there seems to be a scarcity of papers for this meeting should lead us to give it a little attention, especially when we recollect the number of papers read at the Ohio Association (which is only 3 or 4 years old) with the number presented here. I do not know that I exactly understand the working of the rule in the Ohio Association; therefore I would like to have Mr. McMillin explain how that Association proceeds in the premises.

Mr. McMillin—It was suggested at the Columbus meeting of the Western Association that we should adopt the rule of the Ohio Association with respect to getting papers. It was also suggested by the President* of the American Association in his annual address, and I was the chairman of the committee† that took his address under consideration. I think the minutes will show that in both instances I opposed the plan, and while I had good reasons for such opposition these have now lost their force. The first time I opposed it I expected to be elected President of the Ohio Association, and the second time I opposed it I was President of the Ohio Association. Now that that body has a membership of 100, and as they are not allowed to re-elect a man to office until it has gone around among all the members, it will be at least 100 years before I shall again be its President, and so I have no objection to your taking up anything that seems advantageous in its rules—but I did not want you to monopolize it until we got through with it. The plan is this. Our Executive Committee meets each year, some two or three months before the date of the annual sessions. In the meantime the Secretary has been writing to the members of the Association and securing suggestions from them as to what questions they would like to hear discussed. About three times out of five we are able to assign the very question a man suggests back to the suggester. Having been thinking about the topic he is probably better prepared to write upon the subject than anyone else. In that way we get a list of 25 or more subjects suggested. I think the last time we had a list of 50 subjects. Then we cull from them the number that we think we can dispose of, and we assign those papers to the parties whom we feel sure will write upon them. I think it is with other persons largely as it is with me—that the hardest thing about writing a paper is to get the subject and the title. If a subject is assigned almost any of us are willing to jot down something about it. After the Executive Committee have selected the subjects upon which the papers

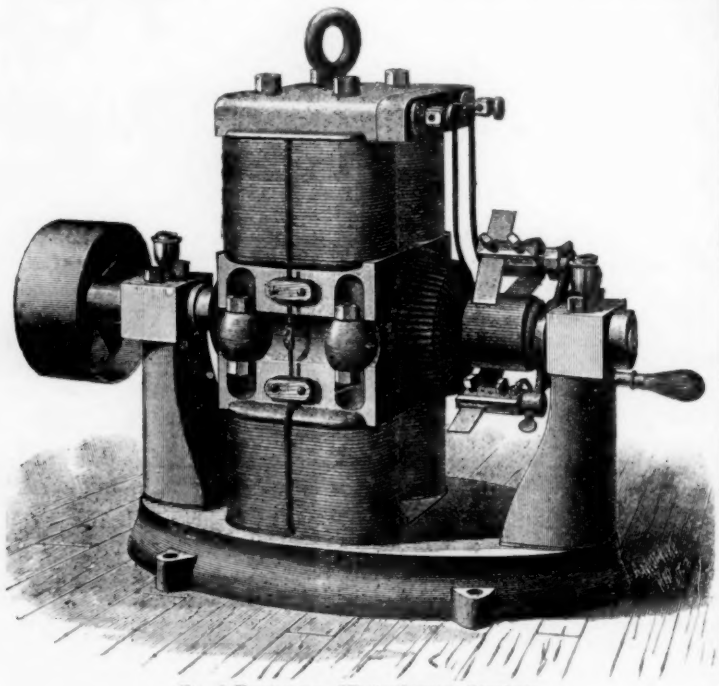
*See Journal, Nov. 2, 1886, p. 264.
†See Journal, Dec. 16, 1886, p. 362.

shall be written, and given the titles, and assigned the subjects to different members, it almost invariably happens that the members write upon the subjects assigned. At the last meeting I think we had twelve papers, and there had been but fourteen subjects assigned. In the two previous annual meetings we had about the same record. We selected fourteen or fifteen subjects, and had twelve or thirteen papers. They have ample time to give the subjects consideration and to prepare the papers, and I think you will bear me out in saying that they are quite as much as you could expect from Ohio men. Now since it might be a little inconvenient for the Western Association to appoint an Executive Committee for the purpose in view—it is convenient for Ohio to cause the Executive Committee to do the work, because being all located in one State, the members can get together without any trouble, while in this Association your Board of Directors is larger, and as its representation is distributed among several States, it would be difficult for them to get together—I therefore suggest that there be a special committee (to consist of the President, the two Vice-Presidents and the Secretary) appointed who shall have authority to select and assign subjects to members, and call for the writng of papers thereon. [Motion seconded by Mr. Egner, and adopted.]

(To be continued.)

## The Waterhouse System of Electric Lighting.

The Waterhouse system of arc lighting, which we herewith illustrate, differs from other systems of electric lighting in a number of important particulars. Not only is the method of regulation new, but the lamps have a form of magnet not heretofore employed. The dynamo is of the closed-circuit type, and has three brushes on the commutator. Two of the brushes are placed diametrically opposite each other, while the third placed near the upper main current brush, and is employed for the purpose of regulation. It will be remembered that in several prominent ystems the current is regulated by shifting the brushes, to increase or reduce the current taken from the commutator, and the shifting is done by a magnet controlling a mechanism. In this case the brushes do not change position, and we naturally look for a resistance coil that takes the



No. 3 Dynamo, Waterhouse System.

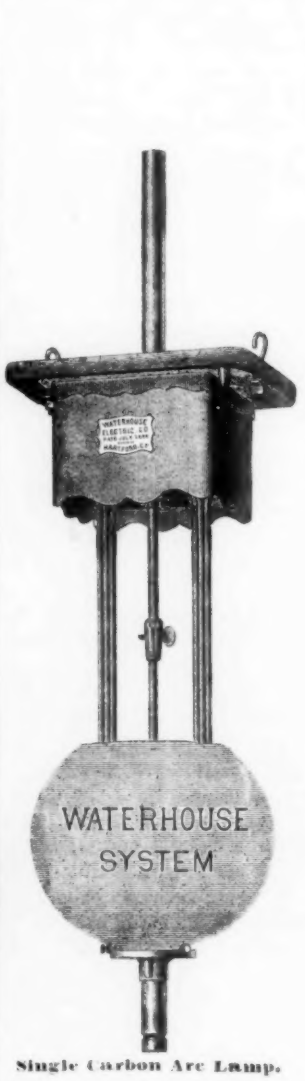
surplus current when the outside resistance is reduced—such as the cutting out of lights, etc. With such an arrangement the same power would be required whether the lights were burning or not; but we find that the Waterhouse regulator does save power as each light is cut out, and while they use the resistance equivalent to an arc lamp only in regulating, it is not for the purpose of compensating for the amount of resistance cut out on the line.

The following test made on an Otto gas engine proves the great efficiency of the Waterhouse regulator; for it will be noticed that as each light was cut out the amount of gas (power) consumed was reduced. The test was made on a 7-horse power gas engine; the machine being an 8-light dynamo. With eight arc lamps in actual duty the amount of gas consumed equaled 132 cu. ft. per hour; on cutting off one light the gas consumption fell to 126 cu. ft. per hour; with six lights the meter registered the passage of 120 cu. ft.; with five, 114 cu. ft.; and four lights required 102 cu. ft. The machine was then short-circuited, without sparks or injury to it, owing to the control of the regulator, and the quantity of gas consumed was reduced to 42.6 cu. ft. per hour, the engine alone requiring 34.8 cu. ft.—making a difference of 7.8 cu. ft. to be charged to the friction of the machine.

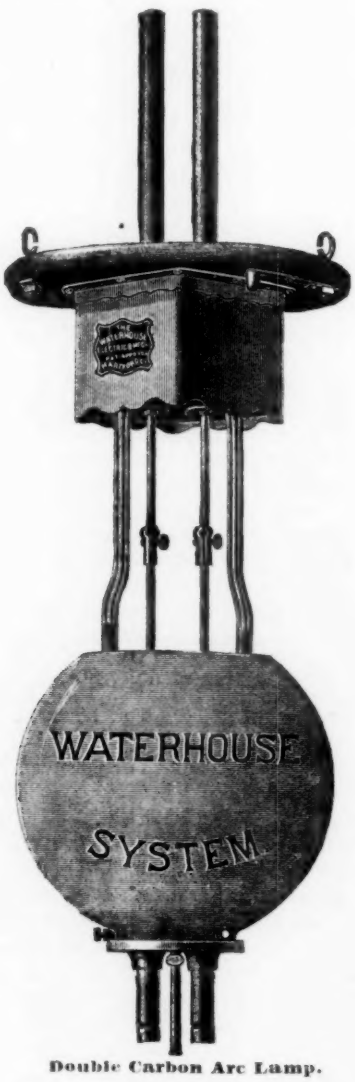
The amount of power developed, including friction, was, for eight lights, 5.18-horse power; and for four lights, including friction, 3.58-horse power.

The figures show the economy of the system, both in regard to power required and efficiency in regulation.

Hartford, Conn., being looked upon as headquarters for mechanical skill, we should therefore expect that machinery manufactured there would be about the best of its kind. Looking, then, at the Waterhouse apparatus from a mechanical point of view, we find that the dynamos are well built and substantial. The armature shaft has long bearings. The machine rests on an iron pan, which serves two purposes—first, for collecting any oil drip that might saturate the floor space; second, to take up the slack in the belt, for the pan is provided with screw and nut for removing the dynamo far enough to accomplish that object.




Single Carbon Arc Lamp.




Double Carbon Arc Lamp.

The same attention to mechanical details is found in the construction of the arc lamps as has been given to the dynamos. The trimming can be done from the outside of the globe holder. The upper carbon rod has a pin for holding it up while the upper carbon is being placed in position. We illustrate the single and double carbon lamps, the magnet being of similar type in both examples. This form of magnet is new, and does not conflict with magnets of other arc lamps in patentable claims even on the magnetic principle involved. It is quadrangular in shape, and has main and shunt circuit coils, wound at right angles from each other, giving two variable poles on the magnet, which are utilized to attract an armature to which a simple lifting device is attached, thus lifting the upper carbon, which in so doing forms the arc. As the carbons burn away, causing separation and consequent high resistance in

the main circuit coils, the current takes the easier passage through the shunt circuit coils, producing a neutralizing effect to the magnetism in the variable poles of the magnet, and the armature that was at first attracted now lowers, by gravitation, and the lamp feeds.

The armature is so susceptible to the changes in the magnetism of the variable poles that the feeding is very gradual and fine, producing a light which is free from sudden flashing and commotion on that account.

The Waterhouse Company manufacture two kinds of single carbon lamps—a clutch-feed and a rack-feed respectively. They are also bringing out several new forms of arc lamps, but based on the same principle of construction. The double carbon lamp has same magnet as above described, and is adapted for all-night runs. It is made with rack-feed, and is constructed to change, from the burnt carbons to the new carbons, instantly, and at the proper time.

The Waterhouse incandescent system has just been completed. Under its operation the automatic regulation admits of the turning off or on of any number of lights without affecting those remaining in circuit; and the saving in power is reduced in same proportion or similar to that above stated when describing the arc system.

Both arc and incandescent lamps can be run from same circuit when so desired. The short-circuiting feature in the Waterhouse dynamos is of great value, as the burning of armatures, so common because of short-circuiting and switch board mistakes, is completely avoided.

## The Cincinnati (Ohio) Gas Light Company vs. Chas. J. Steinau.

In our last issue we promised to make extended reference to the above-named case, and herewith publish the facts.

A short time ago Judge Maxwell enjoined Chas. J. Steinau from using any light in his store on Fourth street except gas, according to the terms of a contract for a term of ten years with the Gas Company.

Steinau had filed a demurrer to the petition, saying a Court of Equity could not interfere in a case of this sort, but that the remedy of the Gas Company was in a suit at law for damages for breach of the contract. Judge Maxwell overruled the demurrer. The Circuit Court has now sustained Judge Maxwell's decision, and the opinion here given holds the same doctrine as the first decision:

The demurrer of the defendant to the petition of the plaintiff admits the making of the contract between the plaintiff and the defendant whereby the Gas Company, in consideration of the engagement of Steinau, bound itself to supply to him at his storeroom, known as the "Palace," under the existing rules and regulations of said Company (except in cases of unavoidable accident), at a price therein agreed upon (and which was less than the rate then paid by the general public therefor), all the gas which might be required to properly illuminate the same for the period of ten years from March 16, 1886.

And that by the contract the defendant bound himself to receive from said Company all the gas necessary for the proper illumination of said premises during said term, in quantities not less than three-fourths of his then average consumption; and he further stipulated that he would not, during said period, introduce into or use on said premises oil lamps, electric lights, or other material or power for general illuminating purposes, or any other gas than that supplied by said Company; that the Company had duly kept and performed all of its stipulations in said contract, and is ready, able and willing to continue to do so, but that the defendant has broken his part of said contract by refusing to receive from the Company all the gas necessary for the proper illumination of said premises, and has introduced and is using on the same materials for general illuminating purposes, other than the gas supplied by the plaintiff, to wit, the Edison electric light, whereby the consumption of gas for illuminating purposes therein has been and will be largely reduced below the above stated monthly average, and much below the quantity he agreed to receive therein from said Company.

On this state of facts the question arises whether the petition states a good cause of action against the defendant, and entitles the Gas Company to the relief demanded, viz.: An injunction to restrain him from using the electric light on said premises, or from using any other material for illuminating purposes, other than the gas supplied by the plaintiff. The contention of the defendant is that although he admits all of these facts, yet that the plaintiff is not entitled to the relief sought because he has a plain adequate remedy at law for the breach of the contract, and that it would be contrary to the usages and practices of courts of equity to grant an injunction in such case.

Has the plaintiff, then, such a remedy at law? If not we understand it to be practically conceded by counsel for defendant that an action of this kind will lie.

It is the claim of the counsel for defendant that the plaintiff has three such remedies at his command, either of which would be plain and adequate, viz. First, that he might bring his action at the end of each month of the term for the damages which had resulted from the breach of contract up to that time; or, second, that he might bring one action now to recover all the damages that he would suffer during the term, on the supposition that there had been a total breach of the contract; or, third, that he might wait until the expiration of the term and bring action to recover all the damages suffered by him before suit was brought.

It is apparent, we think, that this last mode would not afford an adequate remedy. The idea that the defendant can obtain redress for such a breach of this contract by waiting nine years to bring a suit to recover that which the defendant has stipulated to pay monthly is not to be entertained. Suppose the terms were one hundred years instead of ten, the same rule, of course, would apply, and if that was the only mode by which the plaintiff could obtain redress, it is manifest that it would practically be without any remedy.

We suppose it to be true that the plaintiff, under the state of fact existing in this case, would be at liberty to sue upon the contract, at the end of each month during the term, certainly to recover the contract price of the gas actually furnished during that month, and probably to recover also the damages sustained by the Company for a failure to take the amount of gas during that month which he had stipulated to receive. That is, that if there had been a total breach and abandonment of the contract by the defendant, but the Company still furnishes and the defendant still receives a part only of the gas stipulated for, that a right to bring successive actions for the damages so incurred would exist.

But if there be a total breach of the contract on the part of the defendant, as if he had entirely repudiated it, and refused to receive any gas whatever, and so advised the Company, then, as we understand the decision of the Supreme Court in the case of James vs. Board of Commissioners of Allen county to appear in 44 O. S., page —, and reported in Law Bulletin, volume 15, page 287, such excessive actions could not be maintained, but the remedy of the plaintiff would be in one action to recover all the damages he had or might sustain by a breach of the contract, and one recovery thereon would be a bar to a future action.

Conceding, then, the claim of defendant's counsel that under the facts of this case successive monthly action could be maintained, for a breach of the contract in not using the amount of gas stipulated to be used, is a Court of Equity debarred from enjoining the putting into said premises of electric light or other light in violation of the contract? It must be admitted that it is one of the plainest principles of equity jurisprudence that a Court may and ought in a proper case interfere by injunction to protect the rights of a suitor, when without it he could only assert them by bringing a multiplicity of suits. The only question as to this matter is as to the kinds of cases in which it may be done. It is stated in Pomeroy's Equity that the authority of a Court of Equity thus to interfere on this ground is undoubted in this class of cases, viz., "Where, from the nature of the wrong, and from the settled rules of the legal procedure, the same injured party, in order to obtain all the relief to which he is justly entitled is obliged to bring a number of actions against the same wrongdoer, all growing out of the one wrongful act, and involving similar questions of fact and law."—1st Pomeroy's Equity, Sec. 245.

It seems to us that this is precisely the case before us. The wrongful act complained of, and which is sought to be enjoined, is the introduction of the Edison light, in direct and admitted violation of the contract, and the necessary result of which, if continued and used during the term, would be to entitle the plaintiff to maintain successive actions for damages thus caused. If the plaintiff's only remedy is to bring these successive actions, they would be against the same wrongdoer and grown out of the one wrongful act, and must involve similar questions of law and fact; and, according to the clear doctrine of law, a Court of Equity may interfere to prevent such breach of the contract, and not require the plaintiff to resort to the multiplicity of actions to assert his rights.

But it is still further urged that there certainly is another mode by which the plaintiff may have an adequate remedy at law, and that is by an action now to recover the damages which may be found the Company will suffer during the whole term.

But the difficulty with this theory is that, in some respects at least, according to the allegations of the petition and the admission of defendant's counsel that the contract is still in force, and acted upon by both parties, gas is still furnished by the Company and received by the defendant. There is no claim whatever that it has been wholly abandoned by either party. Suppose, then, an action of the kind suggested were brought, what would be the measure of damages of the plaintiff?

The petition only alleges that since the introduction of the Edison light the defendant has used much less gas than he bound himself to use monthly, and will continue to do so. This the defendant admits by his

demurrer. But there is nothing to prevent the defendant from commencing at any time and continuing to use the full quantity contracted to be used, and what answer could be made on the trial by the plaintiff to proof offered by defendant that such was his intention? The mere fact that for several months past the consumption has fallen below the minimum agreed to be received, raises no legal presumption as to the amount that would probably be consumed during the residue of the term.

So far as concerns the damages for the part of the term before the trial, that would be easy to arrive at, but we know of no principle upon which there could be a satisfactory assessment of damages for the time yet to come, where there has not been a total abandonment of the contract, but where the parties are proceeding to carry it out, and where the amount, as in this case, of the gas consumed is simply less than the amount stipulated for, we are of the opinion that such action would not afford an adequate remedy in this case.

But aside from the proposition that a Court of Equity may properly enjoin where it is necessary to avoid a multiplicity of suits, we think that it is now settled by the authorities that where there is a clear and continuing breach of a negative covenant in a contract, and where an injunction against the breach of such covenant will do substantial justice between the parties, by obliging the defendant to carry out his contract or lose the benefit of the breach of it, and the remedy at law is not adequate, or the damages for such a breach are not susceptible of proper assessment by a jury, that a Court of Equity properly may and ought to restrain the defendant from such a breach of the contract, and that such is the case, although the Court might not be able to enforce a complete specific performance as against the other party.

As to this latter proposition there appears to have been a conflict in the authorities. But without any citations from the many cases to which attention has been called by counsel on either side, we simply state that in our opinion the doctrine as above stated is abundantly sustained, and must be considered as a settled rule of equity procedure. We therefore overrule the demurrer filed to the petition, and decline to suspend the injunction heretofore allowed, and, unless the defendant desires to file an answer, will decree in favor of the plaintiff, and make the injunction perpetual—that is, to enjoin the defendant from using upon his premises for illuminating purposes electric light or lights other than the gas furnished by plaintiff during the residue of the term, or so long as the plaintiff complies with its part of said contract.

## Action of Oil on Metals.

Very little is known in regard to the action of well-known oils on metals with which they are brought in contact, and as the subject is one of importance, the results of following experiments, carried out with a view of ascertaining what fixed oils are best adapted for mixing with mineral oils for lubricating purposes, may be of practical value:

Brass is not affected by rape oil, least by seal oil, and most by olive oil.

Copper is not affected by mineral lubricating oil, least by sperm oil, and most by tallow oil.

Iron is least affected by seal oil, and most by tallow oil.

Lead is least affected by olive oil, and most by lard, sperm, and whale oil, which act nearly alike.

Tin is not affected by rape oil, least by olive oil, and most by cotton seed oil.

Zinc seems to be not acted on by mineral lubricating oil, least by lard oil, and most by sperm oil.

*Conversely.*—Cotton seed oil acts least on lead, and most on tin.

Lard oil acts least on zinc, and most on copper.

Mineral lubricating oil has no action on copper and zinc, acts least on brass, and most on lead.

Olive oil acts least on tin, and most on copper.

Rape oil has no action on brass and tin, acts least on iron, and most on copper.

Seal oil acts least on brass, and most on copper.

Sperm oil acts least on brass, and most on lead.

Tallow oil acts least on tin, and most on copper.

Whale oil has no action on tin, acts least on brass, and most on lead.

Mineral lubricating oil has, on the whole, the least action on the metals experimented with, and sperm oil the most.

For lubricating the journals of heavy machinery, either rape or sperm oil is the best to mix with mineral oil. Tallow oil should be used as little as possible.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Capital Increase.—It is reported that the proprietors of the Buffalo (N. Y.) Gas Light Company have made application to increase the capital stock to $1,000,000.

Mr. Frost Goes to Baltimore, Md.—Mr. W. H. Frost, who has been in the service of the Peoples Gas Light Company, of Brooklyn, N. Y., for some years, has accepted a position as Assistant Superintendent in the works of the Chesapeake Gas Company, of Baltimore. He is a careful, competent, and clever man.

Electric Light for Worcester, Mass.—On May 31 the Worcester City Council voted to award the contract for electric street lighting to the Worcester Electric Company, at an agreed upon price of 55 cents per light per night. Last year the price was 60 cents.

Public Lighting at Toronto, Canada.—In the estimates for carrying on the various public charges under control of the Fire and Gas Committee of Toronto, we note that the street lighting budget proper was placed at $79,038, of which amount $23,688 is set apart for electric lights. The estimate for "additional street lighting" is returned at $6,150.

Coming Down at Providence, R. I.—Mr. Slater's Company has again seized the bull by the horns, for we learn that from and after 1st prox. the net rate for gas is to be placed at $1.50 per thousand cubic feet. The present figure is $1.70. Brother Slater, albeit one of the silent sort, manages to keep an active eye on the main chance, and never fails to improve an opportunity.

A Gas Machine Company for the Golden State.—Articles incorporating the Union Gas Machine Manufacturing Company, of San Francisco, Cal., have been filed. The Directors are Messrs. J. Barrows, J. N. Withrow, C. D. McGown, C. L. Harkell, and J. Brickwedel. Capital stock, $200,000, in 10,000 shares. Besides devoting attention to the manufacture of gas machines, these gentlemen also propose to construct gas works.

Taking Formal Possession.—Some time since we explained that the Mechanics Gas Company, originally owned by the Estey Organ Company, was to be purchased by the local gas suppliers of Brattleboro, Vt. The Brattleboro Gas Company took formal possession of their purchase on the 1st inst.

There's Nothing in It.—Mr. Samuel Bailey, Jr., acting on behalf of a syndicate, submitted, at a recent meeting of the Cincinnati (Ohio) Board of Public Affairs, an ordinance granting to himself, "his heirs, associates and assigns," a franchise to pipe to and through the city gas, natural or otherwise, for fuel and power purposes. The ordinance will receive consideration from the Committee on Streets—and also (particularly the "otherwise" portion) investigation at the instance of Gen. Hickenlooper. This means that "there's nothing in it for Bailey."

Dr. Cabot Goes to Europe.—Dr. John Cabot, who sailed from this port on the 4th inst., intends to visit the hospitals of Europe. His tray business will be continued during his absence by his partner, Mr. C. R. Whittier, at 306 to 310 Eleventh avenue. Mr. G. Shepard Page will represent Dr. Cabot in the West and South.

A Gas Thief Punished.—The Police returns of Brooklyn for June 1 show that John Roehringer, a liquor seller doing business at 311 Atlantic avenue, was found guilty of defrauding the Brooklyn Gas Light Company. By arranging a rubber tube to connect the pipes on both sides of the meter he managed to bye-pass that faithful chronicler of the flow of gas, and (for a time) secured his light gratis. The fateful June Police report, however, mentions the further fact that Police Justice Walsh sentenced engineer Roehringer to pay a fine of $200 for his ingenuity and iniquity, although did he so elect he might have gone to prison for 100 days. His fate prompts us to ask the Superintendent of the Flatbush (L. I.) Gas Company about what was done with Deacon Oberglock, who also toyed with a rubber tube.

A Correction.—The following letter, from Mr. J. H. Decker, Supt. of the Hannibal (Mo.) Gas Company, explains itself: "In my contribution on the subject of 'The Selection of Cast Iron Pipe,'* I wrote, 'While we buy by the ton it is to the interest of the manufacturer to work in all the iron possible, and while one side of the pipe will be of the proper thickness the other side will be found from 10 to 20 per cent. too thick; [on the other hand, should we follow the suggestion made it

*See Journal, May 16, p. 310.

will be to the interest of the manufacturer to save all the iron he can, and matters will simply be reversed—that is, while the one side is of the proper thickness the other will probably be from 10 to 20 per cent. too thin] and wherein have we bettered our condition?' In the JOURNAL referred to that portion inclosed in brackets was omitted, which omission made a material change in the sense of the article." We are pleased to make the correction, and are further gratified to say to the fraternity that Brother Decker could not get to the St. Louis meeting—well, because it was a boy, and a bouncer at that.

ANNUAL ELECTION, KANSAS CITY, MO.—At the regular annual meeting of the Kansas City Gas Company a Board of Directors was chosen in the persons of Messrs. W. W. Gibbs, M. J. Payne, E. L. Martin, L. F. Wilson, and J. A. McDonald. Afterward organization resulted in the choice of M. J. Payne for President, H. E. Clark being named as Superintendent for the ensuing year.

ACCEPTED AND AUTHORIZED.—At a special meeting of the stockholders of the Consumers Gas Light Company (Toronto, Can.) the action of the Legislature in authorizing an increase of the Company's stock to $2,000,000 was confirmed. They also passed a bye-law authorizing the Directors to issue $500,000 new stock, in accordance with the provisions of the Act, in such amounts and at such times and places as they consider advisable. Work on the plant betterment is well under way.

FAVORABLE TO THE SYSTEM.—The Managers of the Waterhouse Electric and Manufacturing Company, of Hartford, Conn., print several strong testimonials favorable to their system, in the advertising pages of our current issue.

CHEAPER GAS FOR CEDAR RAPIDS, IOWA.—Mr. Wm. H. Christie, Supt. of the Cedar Rapids Gas Light Company, informs us that from and after first prox. the following schedule of gas rates will rule: Gross, $2.50 per thousand; 10 per cent. off on monthly bills showing a consumption under 5,000 cubic feet; 15 per cent. on monthly consumption over 5,000 and under 10,000 cubic feet; 20 per cent. on monthly consumption exceeding 10,000. Those consumers who use gas in cooking stoves, between the dates of May 1st and Nov. 1st, and take up not less than 1,000 cubic feet each month, are entitled to receive the highest discount. The gross rate is to prevail in all cases where bills are not settled within ten days from date of presentation. The rate at present in vogue calls for a gross charge of $3, with 50 cents off for prompt payment. Mr. A. T. Averill still remains at the head of the Cedar Rapids Company's affairs, and well he knows how to manage them.

PROPOSALS FOR GAS LAMPS AND PILLARS.—Mr. F. W. King, Gen. Supt. of Lamps, etc., for the city of Baltimore, Md., announces that sealed proposals will be received at his office (City Hall building) until Monday, June, 20, at 12 M., to furnish new gas and gasoline lamps for the coming year, as per specifications and sample lamps, these to be seen at his office. Separate proposals to supply gas lamp pillars are also asked for. The proposals will be opened, in the Mayor's office, on the afternoon of the day mentioned.

CHARTERED IN GILPIN COUNTY, COL.—On June 3d articles incorporating the Gilpin Light and Heat Company were filed with the Secretary of State for Colorado. The organizers propose to manufacture and distribute gas and electricity in Gilpin county, and have capitalized their Company in $50,000. This Company, in all likelihood, intends to erect a works at Central City, which is the capital seat of Gilpin county, the town being located in a peculiarly-shaped valley lying at the east base of the mountain chain known as the Snowy Range. It is 40 miles west by north from Denver, with which place it is connected by rail. The famous Gregory gold bearing lode crops out near the lower end of Central City.

THE AUTHORITIES IN A HUFF.—In our last we referred to the desire of the city authorities of Portland, Me., to secure representation in the Board of Directors of the Portland Gas Light Company, and also reported how that desire had been negatived at the annual meeting of the Company. While not fully conversant with the reasons that led to such adverse action, we are nevertheless inclined to the opinion that the city's demand was not unreasonable, in view of the knowledge that the city owns something over one-quarter of the capital stock of the Portland Company; but whether or not the authorities should have been successful, their failure cannot be urged as a plea in defense of the childlike move since taken by them in the proposition mooted to dispose of the city's gas shareholdings at auction to the highest bidder. It really appears incredible that sensible men will occasionally try to injure their noses in order to "spite" some other equally important portion of their frames; but, since seeing is believing, we submit that the Portland City Council was in danger of attempting the strange operation of "spiting itself, in support of which belief we herewith present the following letter from a Portland correspondent: "Two reports were presented by the special committee to whom was referred the advisability of selling the city's gas stock. The majority report, signed by Ald. Gattey (chairman), stated that the committee had considered the matter, and voted (5 to 2) that it is not advisable to sell the stock. The minority report (signed by Ald. Smith and Councilman Spring) recommended the passage of the following: '*Resolved*, That we deem it expedient, and for the best interests of the city, to sell at public auction, to the highest responsible bidder, all the shares owned by the city of stock in the Portland Gas Light Company.' Both reports were laid upon the table without discussion." We would remind the Portland authorities that temperance in action never proceeds from the intoxication of passion.

ANNUAL ELECTION, GEORGETOWN, D. C.—We understand that, on June 4, Messrs. Seymour, Marbury, Smoot, Knowles, Cropley, Brown and Orme were elected a Board of Directors for the Georgetown (D. C.) Gas Light Company.

THE FINDLAY (OHIO) NATURAL GAS CELEBRATION.—The Findlay natural gas celebration, held on June 8, 9 and 10, was probably the most unique gathering (that is, in respect of the inciting cause) ever witnessed in any quarter of the universe. As the daily papers have devoted much space to the publication of the details of the affair, we need not here enlarge upon the matter, although we might say that the success of the undertaking was thorough and complete. It goes without saying that the Findlay gas men were quite equal to the occasion; in fact they bore the brunt of the burden, and deserve the lion's share of the applause.

ROCHESTER (N. Y.) TO BE LIGHTED BY ELECTRICITY.—The Lamp Committee of the Rochester City Council having agreed upon a scheme whereby the entire street lighting of the city was to be turned over to the electricians for the next 5 years, a special meeting of the Council was called to indorse the project, and the same was agreed to. Under the contract the Brush Electric Light Company is to furnish 489 lights, at the following rates: First two years, 30 cents each per night; next two years, 28 cents; fifth year, 27 cents. Lights to be of 2,000-candle power. Rochester Electric Light Company, 100 (or more) arcs, at the uniform rate of 28 cents per night in the life of the contract. Edison Electric Illuminating Company (incandescent lights, of 20-candle power, to replace present kerosene lamps) 700 (or more) lights at the following figures—each per night: 1st year, 4 cents; 2d year, 4½ cents; 3d year, 4¾ cents; 4th year, 5¾ cents; 5th year, 6 cents. Under this scheme, excluding the "or more" possibilities of the contracts, Rochester will have to pay the following sums for street lighting: 1887–8, $82,708; '88–9, $83,986.50; '89–90, $80,486.15; '90–1, $83,041.15; '91–2, $81,110.35. There are great possibilities in the Edison end of that contract, and it will be interesting to note how the 20-candle-power premise of the specification will be adhered to.

BROTHER TRUMBORE SAYS GOOD-BYE.—Mr. Samuel Trumbore, who has been in harness for almost a third of a century, has determined to retire from active business life, and herewith says something about how the stated period was occupied: "I have this day (May 26) resigned my position as Superintendent to the Warren County (Phillipsburg, N. J.) Gas Light Company, with the intention of quitting the gas business for good. Having been connected with the said business since 1856—just 31 years—and in the employ of the Warren County Company from the time of its inception, I thought it might interest some of the readers of your JOURNAL were I to relate some of the changes and improvements that have taken place in Phillipsburgh (it is close to Easton, Pa.) in 31 years. In 1856 the Easton Gas Company, in whose employ I served, was sending out during the winter season about 20,000 cu. ft. nightly, and the loss in unaccounted-for gas, through defective street mains, was as high as 28 per cent. Iron retorts were used, and these would last about six months. The owners were getting $4 per thousand for the gas supplied, and earned a dividend of something like 4 per cent. per annum. In 1869 they introduced clay retorts, which were not much of a success in the first year; but after reducing the dip in hydraulic main to a minimum, and somewhat later on removing the seal, better results were obtained. To-day the Easton folks are sending out about 130,000 cu. ft. pe day, and are selling gas at $1.90. In 1876 I left the Easton Company and came to Phillipsburg, which latter place was being supplied with gas from the Easton Company's mains. Thinking that Phillipsburg could support an independent Company, I broached the subject to the

local capitalists, helped to place the stock in the new enterprise, organized the Company, and put up the works. We commenced with 20 consumers and sold gas at $2.25 net. To-day we have 220 consumers, and they are being supplied with gas at $1.90 per 1,000. The yearly output of the Company is something like 4 millions cu. ft.; a 6 per cent. annual dividend is being paid, which rate has permitted of the accumulation of a small surplus applicable to extensions, and also a sinking fund. I can assure you, however, that the accomplishment of all this was no easy task, for it required much hard labor, both by day and night. I have now made up my mind to let someone else try his hand; so let me bid you good-bye as a gas man. Respectfully yours, SAML. TRUMBORE."

Only those who have had similar experience can appreciate completely the hard drudgery involved in building up a business on the lines followed by Mr. Trumbore, but patient toil sometimes brings with it, after years of doubt and hope, that reward which can only be enjoyed to the full by those who, having known weariness, rest easily in the possession of honest comfort wrung fairly from the encounter with fortune's buffetings.

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A PATENT ISSUED TO GEO. H. GREGORY.—Considerable misunderstanding has existed in regard to the claim of Mr. Geo. H. Gregory, of Brooklyn, N. Y., who contended that he was the original designer of what is known as the "Arm Burner." Mr. Gregory appears at the present time to have much the best of the argument, for we note that, on May 31, a patent (No. 363,892) was issued to him exclusively, the leading features of which are as follows: "A gas burner adapted for use with a horizontal extending arm of a gas fixture, to be detachably secured thereto, comprising a pipe having an upward extending portion and a portion extending in a horizontal direction therefrom, a pipe extending downwardly from the last mentioned portion, an upwardly extending burner tip attached to the last-named pipe, a shade surrounding the downwardly extending pipe, and a support for the same."

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TRIED BY FIRE.—Some time ago we noted that Mrs. S. S. Frackelton, of Milwaukee, Wis., had patented a portable gas kiln, for firing decorated china, which might be readily and profitably used by amateur workers in that line. Now, as some of the amateurs may possibly require a hint or two to cause their operations in decorative attempts to take on the desired effect, we call their attention to the fact that Mrs. F. is also the author of a volume, entitled "Tried by Fire," which describes in an elaborate manner the art of china painting. Those who wish to secure copies of that treatise can be supplied by an order sent to us. The work is profusely illustrated.

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Our pipe is being very largely used for conveying water, and is giving the very greatest satisfaction. There is an old saying that "The proof of the pudding is in the eating," and we all know that it is a very easy matter to get up a process to cover iron with a coating of some foreign material; but, heretofore, these processes have not stood the test of time.

Respectfully yours, W. T. Wells, President.

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### A Righteous Decision.

Office Kansas City Gas Lt. and Coke Co.,
Kansas City, Mo., June 8, 1887.

To the Editor American Gas Light Journal:

Probably you have not entirely forgotten the disastrous explosion which completely demolished the purifying house and boxes of the Kansas City Gas Light and Coke Company, on a stormy night in December, 1885. The concussion was so great that a number of buildings in the vicinity were more or less damaged. In all cases where the houses were undoubtedly injured by the explosion the Company repaired the damages, though admitting no liability. This liberality of the Gas Company was sought to be taken advantage of by the owner of a brick building located a furlong from the gas works, who made a claim for damages equal to the value of his house.

An inspection of the building was made under direction of the Gas Company, and it was found that the building had sustained no injury from the explosion, excepting a few broken panes of glass. This the Company was willing to repair; but that did not satisfy the rapacious owner, and the disagreement resulted in a suit against the Company for damages, in which negligence was, of course, alleged.

The suit came to trial in Judge Gill's division of the Circuit Court, in this city, recently. Numerous witnesses were examined in the trial of the cause, bringing out all the material facts. The plaintiff utterly failed to show negligence of the Gas Company, even with the aid of the chief of the Fire Department, whose evidence was relied upon by plaintiff to establish that theory. On the other hand, the Gas Company showed that the usual care in the management of gas works was in practice up to the moment of the explosion. There was no escaping gas, and no back pressure; the exhauster was working properly; the engineer was at his post of duty, and there was no indication of trouble. The concussion came and the walls of the building fell in and out, destroying the four purifying boxes and burying the engineer. That individual, when extricated from the debris, was found to have a broken leg, but had not been burned a particle—not even his clothing showed evidence of contact with fire.

The issue was well argued for plaintiff by counsel, and submitted to the Court, without argument, by defendant's counsel, on the evidence. The Court held that no negligence had been shown, on the contrary that unusual care had been proven by the defendant; that there was no explosion of gas at all; that if the explosion had been caused by the banking of escaping gas in the building until it came in contact with the gas jets in the engine room, as plaintiff had attempted to show, the result would have been the blowing of the walls altogether outward, and to have seriously, if not fatally, burned the engineer on duty. The fact that the walls of the building fell in as well as out, and that a human being was in the midst of the alleged gas explosion, and was not burned at all, not even his hair or whiskers having been scorched, is a complete refutation of the plaintiff's theory.

Judgment was given for the defendant. The finding of the Court sustained the theory of the Gas Company's officers that the explosion was the work of incendiaries. Respecfully yours,

M. J. Payne, President.

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Considerable change has been effected in the method of carrying on the business enterprise heretofore so inseparably connected with the name of Thos. F. Rowland. For the new arrangement see advertisement of "The Continental Iron Works."

local capitalists, helped to place the stock in the new enterprise, organized the Company, and put up the works. We commenced with 20 consumers and sold gas at $2.25 net. To-day we have 220 consumers, and they are being supplied with gas at $1.90 per 1,000. The yearly output of the Company is something like 4 millions cu. ft.; a 6 per cent. annual dividend is being paid, which rate has permitted of the accumulation of a small surplus applicable to extensions, and also a sinking fund. I can assure you, however, that the accomplishment of all this was no easy task, for it required much hard labor, both by day and night. I have now made up my mind to let someone else try his hand; so let me bid you good-bye as a gas man. Respectfully yours, SAML. TRUMBORE."

Only those who have had similar experience can appreciate completely the hard drudgery involved in building up a business on the lnes followed by Mr. Trumbore, but patient toil sometimes brings with it, after years of doubt and hope, that reward which can only be enjoyed to the full by those who, having known weariness, rest easily in the possession of honest comfort wrung fairly from the encounter with fortune's buffetings.

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A PATENT ISSUED TO GEO. H. GREGORY.—Considerable misunderstanding has existed in regard to the claim of Mr. Geo. H. Gregory, of Brooklyn, N. Y., who contended that he was the original designer of what is known as the "Arm Burner." Mr. Gregory appears at the present time to have much the best of the argument, for we note that, on May 31, a patent (No. 363,892) was issued to him exclusively, the leading features of which are as follows: "A gas burner adapted for use with a horizontal extending arm of a gas fixture, to be detachably secured thereto, comprising a pipe having an upward extending portion and a portion extending in a horizontal direction therefrom, a pipe extending downwardly from the last mentioned portion, an upwardly extending burner tip attached to the last-named pipe, a shade surrounding the downwardly extending pipe, and a support for the same."

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An inspection of the building was made under direction of the Gas Company, and it was found that the building had sustained no injury from the explosion, excepting a few broken panes of glass. This the Company was willing to repair; but that did not satisfy the rapacious owner, and the disagreement resulted in a suit against the Company for damages, in which negligence was, of course, alleged.

The suit came to trial in Judge Gill's division of the Circuit Court, in this city, recently. Numerous witnesses were examined in the trial of the cause, bringing out all the material facts. The plaintiff utterly failed to show negligence of the Gas Company, even with the aid of the chief of the Fire Department, whose evidence was relied upon by plaintiff to establish that theory. On the other hand, the Gas Company showed that the usual care in the management of gas works was in practice up to the moment of the explosion. There was no escaping gas, and no back pressure; the exhauster was working properly; the engineer was at his post of duty, and there was no indication of trouble. The concussion came and the walls of the building fell in and out, destroying the four purifying boxes and burying the engineer. That individual, when extricated from the debris, was found to have a broken leg, but had not been burned a particle—not even his clothing showed evidence of contact with fire.

The issue was well argued for plaintiff by counsel, and submitted to the Court, without argument, by defendant's counsel, on the evidence. The Court held that no negligence had been shown, on the contrary that unusual care had been proven by the defendant; that there was no explosion of gas at all; that if the explosion had been caused by the banking of escaping gas in the building until it came in contact with the gas jets in the engine room, as plaintiff had attempted to show, the result would have been the blowing of the walls altogether outward, and to have seriously, if not fatally, burned the engineer on duty. The fact that the walls of the building fell in as well as out, and that a human being was in the midst of the alleged gas explosion, and was not burned at all, not even his hair or whiskers having been scorched, is a complete refutation of the plaintiff's theory.

Judgment was given for the defendant. The finding of the Court sustained the theory of the Gas Company's officers that the explosion was the work of incendiaries. Respecfully yours,

M. J. Payne, President.

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Considerable change has been effected in the method of carrying on the business enterprise heretofore so inseparably connected with the name of Thos. F. Rowland. For the new arrangement see advertisement of "The Continental Iron Works."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

Editor—JOS. R. THOMAS, C.E.
Asst. Editor—T. J. CUNNINGHAM.
Manager—C. E. SANDERSON.

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This is a recognized official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY, VENTILATION, SANITARY IMPROVEMENT, AND GENERAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

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*Germany*—B. WESTERMANN & Co., of New York

THURSDAY, JUNE 16, 1887.

## The Market for Gas Securities.

The city gas share market, at least so far as Consolidated shares are concerned, offers an excellent opportunity for purchasers at ruling rates. To-day (June 14) the opening price is returned at 81¼, and at that quotation there ought to be two points in it for buyers, the turn to be made before July 1. The Standard Company managers are going right along with construction work, but their future doings need not concern investment holders of Consolidated shares. We repeat that Mutual seems to present a safe front to investors, for the people now most heavily interested in the Company are well able and quite disposed to manage its affairs cleverly in case war is to be declared.

Brooklyn shares have taken an upward trip, and are likely to continue the journey for some steps ere their progress is checked. Comparing quotations for a fortnight back with those at present reported, it will be seen that the advance has been a pronounced one. We note the following sales at auction: 47 shares, Brooklyn, at 107¾; 14, Citizens, Brooklyn, at 60½; 1, Metropolitan, at 87¼; also, 50 shares, California Gas and Construction Company, at $6.

Montreal gas has sold up to 220¾. The Syracuse (N. Y.) Company's new issue of $150,000 stock is to be offered at par, *pro rata*, to holders of record. Baltimore (Md.) shares are strong; and New Orleans (La.) gas is somewhat stronger. The Bay State (Boston) Company's managers are said to be anxious to secure control of the entire gas supply of Boston, and seem to have enlisted the services of the advertising department of the New York *Tribune* to secure that end. We have an idea, however, that their anxiety will not be ended for some time to come.

Equitable gas (Baltimore, Md.), 1,089 shares, at auction, at 40–45.

## Gas Stocks.

**Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,**
16 WALL ST., NEW YORK CITY.
JUNE 16.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

| | Capital. | Par. | Bid | Asked |
|---|---|---|---|---|
| Consolidated | $35,430,000 | 100 | 80¾ | 81¼ |
| Central | 440,000 | 50 | 30 | — |
| " Scrip | 220,000 | — | 47 | 57 |
| Equitable | 2,000,000 | 100 | 126 | 130 |
| " Bonds | 1,000,000 | — | 113 | 115 |
| Harlem, Bonds | 170,000 | — | — | — |
| Metropolitan, Bonds | 658,000 | — | 110 | 113 |
| Mutual | 3,500,000 | 100 | 101 | 103 |
| " Bonds | 1,500,000 | 1000 | 101 | — |
| Municipal, Bonds | 750,000 | | — | — |
| Northern | 125,000 | 50 | 30 | — |
| " Scrip | 108,000 | | | |
| Yonkers | | 50 | — | 80 |
| Richmond Co., S. I. | 300,000 | 50 | 50 | — |
| " Bonds | 12,000 | — | — | — |
| Gas Co's of Brooklyn. | | | | |
| Brooklyn | 2,000,000 | 25 | 107 | — |
| Citizens | 1,200,000 | 20 | 59 | 61 |
| " S. F. Bonds | 320,000 | 1000 | — | 103 |
| Fulton Municipal | 3,000,000 | 100 | 141 | 142 |
| " Bonds | 300,000 | | — | 106 |
| Peoples | 1,000,000 | 10 | 61 | 63 |
| " Bonds (5's) | 368,000 | — | 97 | — |
| " " (6's) | 94,000 | — | 100 | — |
| Metropolitan | 1,000,000 | 100 | 87 | — |
| Nassau | 1,000,000 | 25 | 105 | — |
| " Ctfs | 700,000 | 1000 | 100 | — |
| Williamsburgh | 1,000,000 | 50 | 121 | 123 |
| " Bonds | 1,000,000 | — | 111 | — |
| Out of Town Gas Companies. | | | | |
| Boston (Mass.) Gas Co. | 2,500,000 | 500 | 193 | 200 |
| Buffalo Mutual, N. Y. | 750,000 | 100 | 90 | 95 |
| " Bonds | 200,000 | 1000 | 95 | 100 |
| Citizens, Newark | 1,000,000 | 50 | 140 | 145 |
| " " Bonds. | 45,000 | — | — | — |
| Chicago Gas Trust | | 100 | 63 | 64 |
| Cincinnati G. & C. Co. | 6,000,000 | 100 | 184 | 185 |
| Consolidated, Balt. | 6,000,000 | 100 | 74¾ | 75 |
| " Bonds | 3,600,000 | | 107 | 107½ |
| Chesapeake, Balt. | 1,500,000 | 100 | 100 | — |
| " | 1,000,000 | | 100 | 102 |
| Consumers Toronto | 1,000,000 | 50 | 192 | — |
| Central, S. F., Cal. | | | 86 | 100 |
| Capital, Sacramento, Cal. | | | 56 | 58 |
| Hartford, Conn. | 750,000 | 25 | 140 | 142 |
| Jersey City | 750,000 | 20 | 168 | — |
| Laclede, St. Louis, Mo. | 2,000,000 | 100 | 125 | — |
| Louisville, Ky. | 2,570,000 | 50 | 130 | 132 |
| Little Falls, N. Y. | 50,000 | 100 | 95 | 100 |
| " Bonds | 25,000 | — | 100 | 103 |
| Montreal, Canada | 2,000,000 | 100 | 220 | 221 |
| New Haven, Conn. | | 25 | 193 | 197 |
| Oakland, Cal. | | | 37 | 37½ |
| Peoples, Jersey City | | — | 25 | 30 |
| " " Bonds. | | | — | — |
| Paterson, N. J. | | 25 | 90 | — |
| Rochester, N. Y. | | 50 | 75 | 80 |
| Syracuse, N. Y. | 350,000 | 25 | — | — |
| St. Louis, Missouri | 600,000 | 50 | — | — |
| San Francisco Gas Co. | | | | |
| San Francisco, Cal. | 10,000,000 | 100 | 60 | 60½ |
| Memphis (Tenn.) Gas | 750,000 | 100 | — | — |
| " Bonds. | 240,000 | 100 | 103 | — |
| Washington, D. C. | 2,000,000 | 20 | 210 | — |
| Wilmington, Del. | | 50 | 200 | 208 |
| Havana (Cuba) Gas Co. | 3,000,000 | 100 | 18 | 20 |
| " Bonds | 550,000 | | 102 | — |

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## Engagement Desired.

The advertiser, an English Gas Engineer, age 25, seeks an engagement

**As Gas Works Manager or Assistant Manager.**

Thoroughly understands the manufacture and distribution of gas, and is a good draughtsman and chemist. Address

672-6t "H." care this Office.

## Engagement Desired,

By a young man of several years' experience in the manufacture and distribution of coal gas, either

**As Superintendent of a Small Works or Assistant in a Large Works,**

Or with a Manufacturing Company or Contractors for the erection of gas works. Best of references. Address

672-2t "A." care this Office.

## FOR SALE,

# Gas Works

IN A GROWING TOWN IN THE WEST.

The undersigned offers for sale a Coal Gas Works, in good condition, in a Western State. Population good. The reason for selling is that the owner cannot give the works his personal attention. Address

672-tf "O. E.," care this Journal.

## FOR SALE,

Ten No. 2 Siemens Regenerative Gas Lamps,

With Factory Fixtures and Reflectors complete and in order. Only used three or four months. Will be sold cheap.

DANVILLE NAIL AND MFG. CO.,
Danville, Pa.

## FOR SALE.

The St. Paul (Minn.) Gas Light Company desires to enlarge its works, and offers for sale the following apparatus, which is in perfect condition:

**Six Benches of 6's.**
**Four Benches of 5's.**
**One Scrubber,**
4 ft. 6 in. by 4 ft. 6 in. by 15 ft.
**One 10-inch Exhauster.**
**Four 8 by 12 Purifiers,**
10-inch connections.
**Two 8-Horse Power Boilers.**
**One 4-Horse Power Engine.**
**One Coke Crusher.**

THE ST. PAUL GAS LIGHT CO.,
670-4t E. I. FROST, Sec. & Treas.

## FOR SALE,

Two Sinuous Friction Condensers,

Each 1 ft. 3 in. wide by 11 ft. 3 in. long, and 18 ft high, of sufficient capacity for 225,000 cu. ft. per day. Apply to

665-12 PETER COFFEY, Supt. Gas Co., Peoria, Ill.

## ENGLISH

"Journal of Gas Lighting."

Issued weekly. New volume commences Jan. 1, 1887. Price, $7 per annum. Subscriptions taken by

**CHARLES NETTLETON, Agent for U. S.**

No. 115 BROADWAY, N. Y. CITY.

# Bouton Foundry Co.,

FOUNDERS AND MACHINISTS,

**CHICAGO, ILL.**

**Gas Works Apparatus,**

PURIFIERS, CONDENSERS,

Bench Work,

**SPECIALS, LAMP POSTS,**

**SCRUBBERS,**

**Iron Roofs and Floors.**

Plans and Estimates furnished for new works or extensions of old works.

# Water & Gas Pipe.

RUSTLESS Send for New Catalogue. RUSTLESS

**The WELLS RUSTLESS IRON COMPANY,**

**Nos. 7 and 9 Cliff Street, New York City.**

## GASHOLDER TANK CONSTRUCTION, ETC.

Gas Companies and others about to erect Gasholders will find it profitable to consult W. C. WHYTE, who for over thirty years has made a specialty of

**Holder Tank Excavation and Mason Work.**

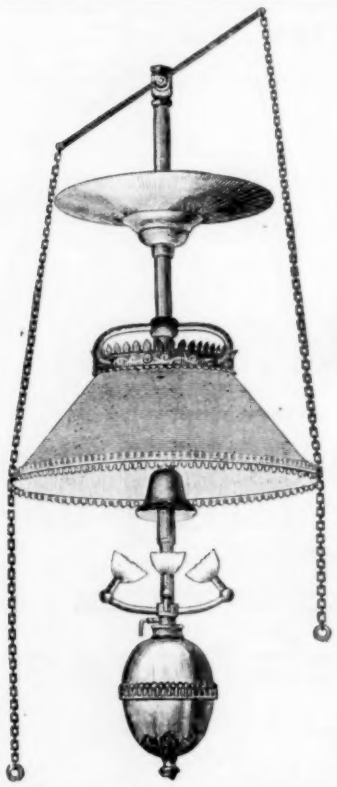
Fifty tanks now in operation show the sort of work done. Address

**W. C. WHYTE, No. 15 Cortlandt St., N. Y. City.**

# To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers.

**THE SIEMENS-LUNGREN CO., 21st St. & Washington Av., Phila., Pa.**



# THE ALBO-CARBON LIGHT!

## The Perfection of Gas Lighting.

Producing the Highest Illumination yet obtained from Gas, and

**EFFECTING A SAVING IN ITS CONSUMPTION.**

It has been most effective in

## Replacing Electricity,

AFFORDING A

SOFT WHITE LIGHT

of **EXTREME BRILLIANCY & POWER.**

It has been most successful in

## Supplanting Kerosene,

Giving Increased Light, Less Heat, and Perfect Safety

**WITHOUT ADDITIONAL COST.**

**NOTICE.**—Suits are pending in the United States Circuit Courts in Illinois and Pennsylvania against various parties for infringement of our Letters Patent No. 247,925, dated October 4, 1881, and No. 353,862, dated Jauary 5, 1886. The first of these suits has come up for hearing, and an injunction has been granted therein. The second of said suits has not yet been reached for hearing. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our Patents. We intend to prosecute all parties infringing patents owned by us.

## THE ALBO-CARBON LIGHT COMPANY, - - - NEWARK, N. J.,

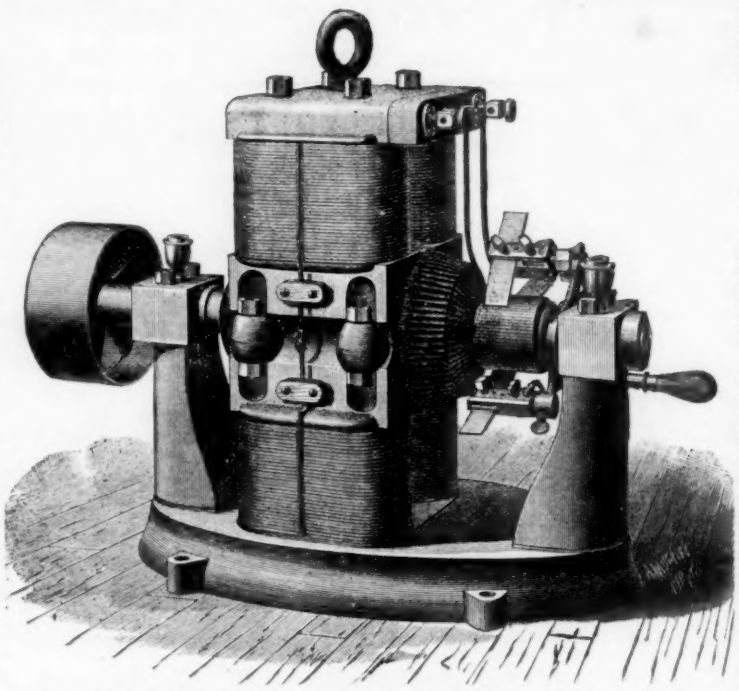
**Sole Manufacturers for the United States.**

# The Waterhouse System of Arc and Incandescent Lighting.

OFFICE HARLEM LIGHTING CO., }
242 E. 122d St., New York, Apr. 1, 1887. }

WATERHOUSE ELECTRIC & MFG. CO., Hartford, Conn.—Gent'emen: It is with pleasure we write in commendation of your system of Electric Lighting. Before entering into the business the first question to settle in our minds was, "What shall we do to give ourselves (a new company) an equal footing or, if possible, an advantage over the old and established companies in such a field as New York city," which was apparently overrun with various systems in close competition with one another. There was but one answer to this question, to wit: "Get the system that will produce the best light at the least cost." We carefully looked into the best systems, aided by those who had had much experience in such matters, and finally adopted your system; and after several months' experience in operating the same we feel it our duty to say we are more than pleased. Our customers have no complaints, and our business is increasing beyond our expectations. We have run 116 of your arc lamps from our 75-horse power engine, with three belts on one pulley and two on the other, and with 80 pounds of steam. We are fully satisfied that we produce the best light in New York, and that we do it at a cost of from 30 per cent. to 40 per cent. less than any other company for coal and repairs. We have just increased our plant to 270 lamps, with power for 700 lamps, and expect to increase to 1,000 within another year. Our station will be second to none on the continent. We think your system of regulation deserves special mention; it works instantaneously, and keeps the lights perfectly steady. The machines run cool, and no burning out of any part has occurred in either machine or lamps. The light is white and steady, producing the appearance of sunlight. We will gladly answer any inquiries in reference to your system from anyone who may wish to know its many advantages.

HARLEM LIGHTING CO.,
A. L. SOULARD, Prest.



### When in Competition.

NEWARK SCHUYLER ELECTRIC LT. CO., }
NEWARK, N. J., Mar. 23, 1887. }

WATERHOUSE ELECTRIC & MFG. CO., Hartford, Conn.—Gentlemen: The Waterhouse system has been in operation in our station for the past 2½ months, and we are pleased to say it has given both our company and our customers entire satisfaction. We doubt if the light produced is equaled in color or steadiness by any other system. We consider your three-quarter (¾) arc fully as strong as the so-called 2,000-candle power lights owned by other parties with whom we are competing, and we are daily substituting, in place of the said 2,000-candle power lamps, our three-quarter arcs with perfect satisfaction to the customers. We have thus placed 96 lamps during the past 60 days, and have orders for enough to tax our capacity, which, however, we expect to increase. Your regulator we consider deserves especial mention; it works so quick and perfect, immediately reducing the power consumed in proportion to the lights turned off. Your workmanship and material, so far as we can judge, are of the best, and we are pleased to say your claims and representations, when negotiating with us, have now been fully demonstrated. Yours truly,

F. B. MANDEVILLE, V.-Prest. & Treas.

NOTE.—Since above date 100 more arc lights have been added to this plant.

FEATURES OF THE SYSTEM.—A White, Noiseless, Steady Arc Light; Instantaneous Automatic Regulation; Great Economy of Power.

MANUFACTURED BY

## THE WATERHOUSE ELECTRIC & MFG. COMPANY,

Factory, Colt's West Armory. HARTFORD, CONN.

# BARTLETT, HAYWARD & CO.

## Baltimore, Md.

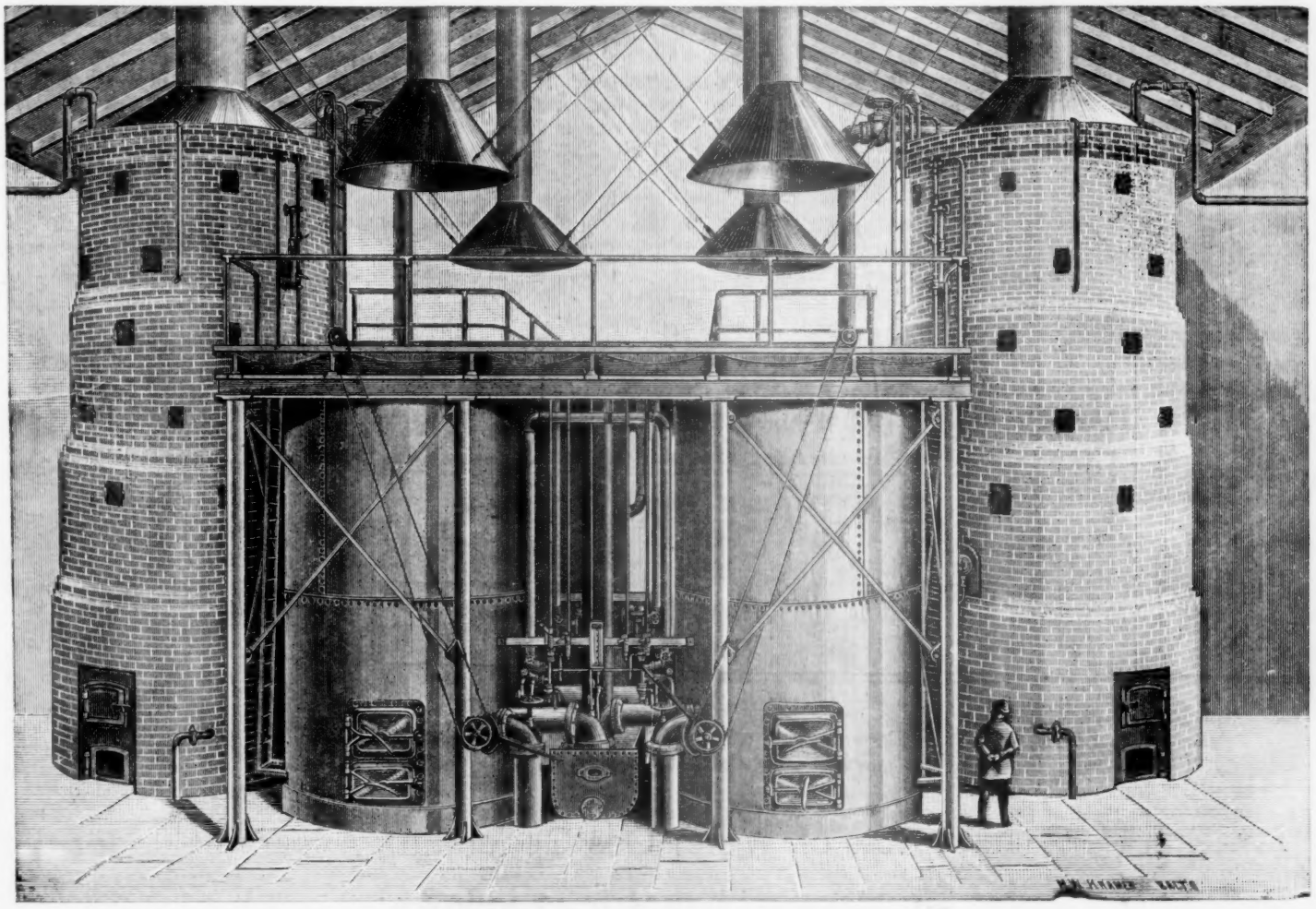
## Munich Regenerative Furnace, System Drs. Schilling & Bunte.

Greatest durability; minimum of attention; complete distillation in 3½ hours; 10 to 13 pounds of coke to hundredweight of coal; no clinker; no carbonic oxide in regenerative flues.

## TWO AND THREE-LIFT TELESCOPIC GASHOLDERS,

With Wrought Iron Tanks, constructed above ground, of any magnitude.

**Condensers, Scrubbers, Purifiers, Bench Castings, Roofs, Boilers, Etc.**



**The Wilkinson Water Gas Process.**

Introducing the Munich Regenerative Furnace for Coal Gas, we find on the part of many Gas Companies the desire to combine to a greater or less extent an efficient system of making high candle power Water Gas; and with a view of enabling this to be done WITHOUT EXCESSIVE CHARGES FOR PATENT RIGHTS, ETC., we have acquired, by purchase, the exclusive right to construct all the Water Gas Apparatus under the valuable "Wilkinson" Patents.

The results obtained by this Process are far better than those obtained by any other apparatus, especially where an illuminating gas of high candle power or a fuel gas of intense temperature is required.

The Process is uninterrupted, making gas of uniform quality and quantity. Its greatest advantages are maximum production with minimum material and labor, combined with great durability of apparatus.

The Process is in successful operation at the works of the N. Y. Mutual Gas Company, New York; Consolidated Gas Company, Baltimore, Md.; the Hudson County Gas Light Company, of Hoboken, N. J.; and at Rye, N. Y.

We shall be glad to give further detailed information upon application.

**BARTLETT, HAYWARD & CO.**

EXHAUSTERS. EXHAUSTERS. EXHAUSTERS.

# THE ROOTS GAS EXHAUSTER.

CINCINNATI, OHIO, March 24, 1887.

P. H. & F. M. ROOTS, Connersville, Ind.: Gentlemen—I have the honor to say that after the continuous and uninterrupted use of your Exhausters for a period of fifteen years, it affords me pleasure to endorse them in the highest possible terms. Very respectfully,

A. HICKENLOOPER, Prest. Cincinnati Gas Co.

CINCINNATI GAS LIGHT AND COKE CO., Cincinnati, Ohio, two No. 6 Gas Exhausters, with Engine, for their new works, which, with the two No. 6 Exhausters, without Engines, at their old works, and one No. 3, with Engine for pumping, for their station at Carthage, make five Exhausters in all for this Company.

CHICAGO, ILL., March 24, 1887.

Messrs. P. H. & F. M. ROOTS, Connersville, Ind.: Dear Sirs—We have two of your No. 6 Exhausters at our works, which have been running for several months, and are giving very good satisfaction. Yours truly,

THEO. FORSTALL, Prest.

THE CHICAGO GAS LIGHT AND COKE CO., Chicago, Ill., two No. 6 Gas Exhausters and Engine combined on same bed-plate.

ST. LOUIS, MO., March 21, 1887.

Messrs. P. H. & F. M. ROOTS, Connersville, Ind.: Dear Sirs—In 1872 one of your No. 5 Exhausters was placed in these works, and worked satisfactorily. March, 1885, it was replaced by one of your No. 6 Exhausters. The latter has been in almost constant use the past two years, has worked up to all my expectations, and is to-day in apparently as good condition as when first set up. It has not cost one cent for repairs in all that time. I have also had one of your No. 1 Exhausters, with Engine on same bed-plate, fitted with your valves and Huntoon Governor, placed in a small works under my control, and in its operation it seems as near perfection as I ever expect an Exhauster to become. Without in the least disparaging Exhausters of other makes, I may say that your Exhauster may be safely recommended as unsurpassed by any other, to those requiring such machines. Yours respectfully,

FREDERIC EGNER, Eng. and Supt.

CLEVELAND, OHIO, March 22, 1887.

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South Bend Gas Light Co., South Bend, Indiana.—Daily capacity, 250,000 cu. ft.
Sheboygan National Gas Comp'y, Sheboygan, Wis.—Daily capacity, 120,000 cu. ft.
Salina Gas Light Company, Salina, Kansas.—Daily capacity, 120,000 cu. ft.
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Jefferson City Gas Light Co., Jefferson City, Mo.—Daily capacity, 120,000 cu. ft.
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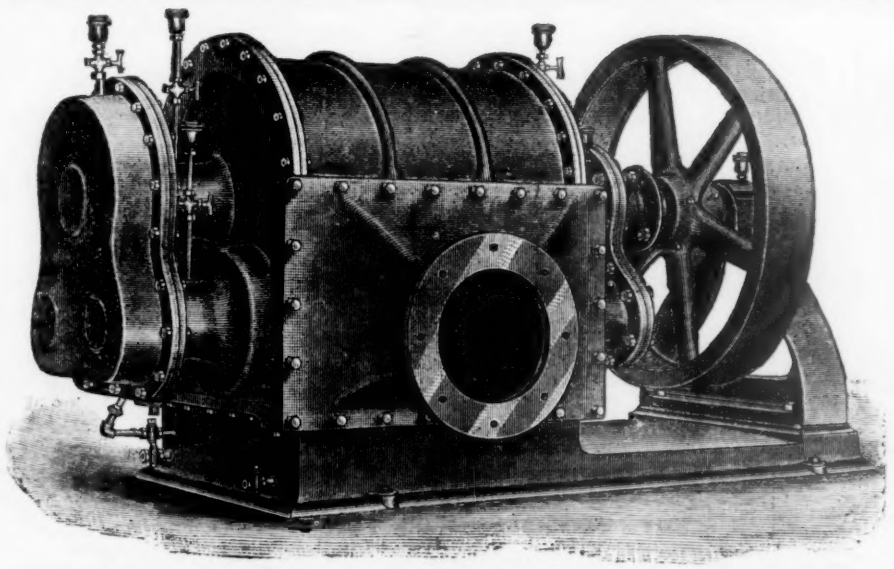

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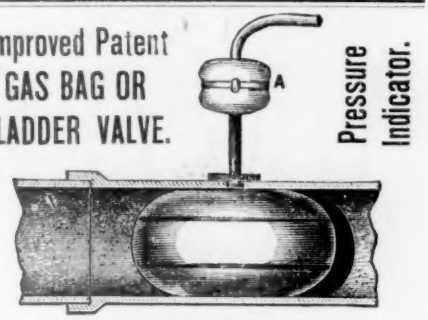


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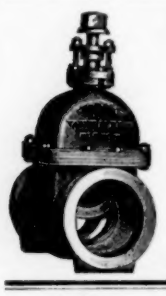

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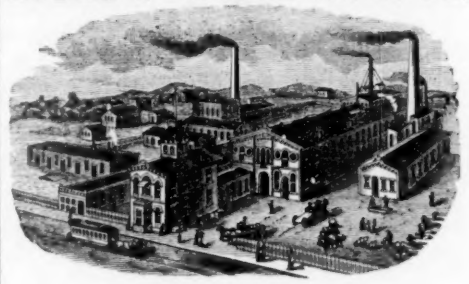

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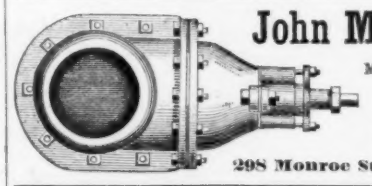

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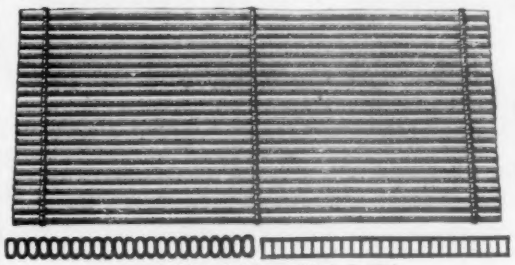

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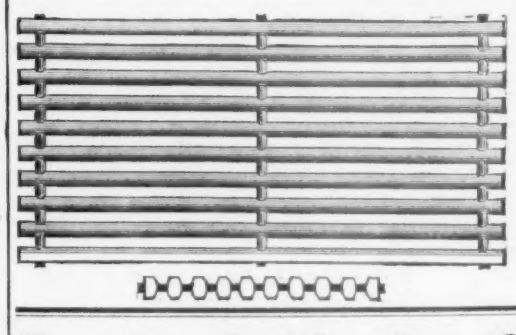

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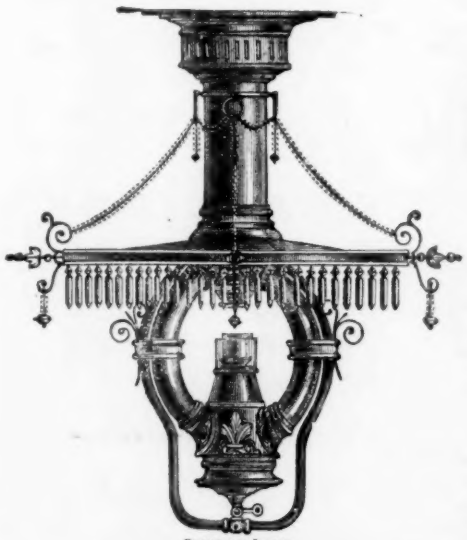

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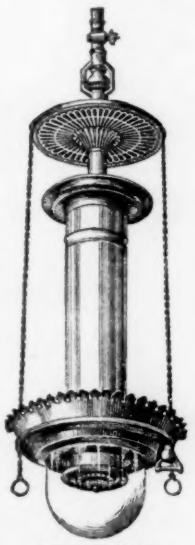

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# THE PATENT "STANDARD" WASHER-SCRUBBER

**(KIRKHAM, HULETT & CHANDLER PATENT.)**

Has been adopted by gas companies in all parts of the world. Between 300 and 400 companies, with the enormous daily output of over 300,000,000 cubic feet, are now using it. "Standard" Washer-Scrubbers have been erected for the following gas light companies since Jan. 1, 1886:

| | | | |
|---|---|---|---|
| WALLASEY, ENGLAND | 750,000 | cubic feet. | |
| NEWARK, ENGLAND | 350,000 | " | |
| BUFFALO, U. S. (MUTUAL) | 500,000 | " | |
| BERLIN, GERMANY | 1,250,000 | " | |
| SO. BRISBANE, AUSTRALIA | 300,000 | " | |
| LEEDS, ENGLAND | 2,000,000 | " | |
| FURTH, GERMANY | 400,000 | " | |
| FREIBURG, GERMANY | 200,000 | " | |
| NINE ELMS, LONDON | 3,000,000 | " | |
| MELBOURNE, AUSTRALIA (2) | 3,000,000 | " | |
| GLUCKAUF COKE WORKS, GERMANY. | 200,000 | " | |
| BOURNEMOUTH, ENGLAND | 1,000,000 | " | |
| RICHMOND, SURREY, ENGLAND | 1,500,000 | cubic feet. | |
| BRIDGEPORT, U. S. | 500,000 | " | |
| TORONTO, CANADA | 1,000,000 | " | |
| HARTFORD, U. S. | 1,000,000 | " | |
| DETROIT, U. S. | 750,000 | " | |
| SINGAPORE, CEYLON | 300,000 | " | |
| BRUNSWICK, GERMANY | 300,000 | " | |
| LILLE, FRANCE | 750,000 | " | |
| CADIZ, SPAIN | 300,000 | " | |
| READING, ENGLAND | 2,000,000 | " | |
| LINCOLN, U. S. | 250,000 | " | |
| ST. LOUIS, U. S. (LACLEDE) | 1,000,000 | " | |
| BROOKLYN, U. S. | 2,000,000 | " | |
| BROOKLYN, U. S. (NASSAU) | 1,000,000 | " | |
| DENVER, U. S. | 1,000,000 | " | |

That this apparatus is really the *standard* is indicated by the following names of important houses who represent this invention in the different countries of the world:

**FRANCE & BELGIUM, Mons. J. A. Berly, 31 Rue Boinod, Paris. HOLLAND & DUTCH COLONIES, Mess. W. Hoven & Zoon, Rotterdam.**
**GERMANY and AUSTRO-HUNGARY, Berlin-Anhaltische-Actiengeselschaft, Berlin, Moabit, and Dessau.**
**RUSSIA, Mr. F. Bley, Galernaya, 44, St. Petersburg. SPAIN, Mess. Nicolas, Chamon, Foiret & Cie., 29 Rue Claude-Vellefaux, Paris.**
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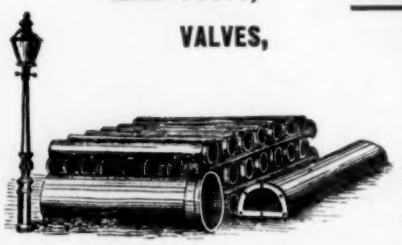
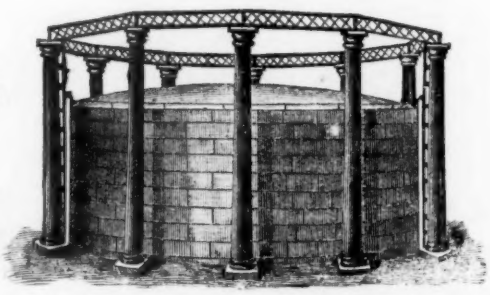


Estimates and Specifications for NEW WORKS or EXTENSIONS or ALTERATIONS of OLD ONES.



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| Albuquerque, N. M. | Elgin, Ills. | Key West, Fla. | Osawatomie, Kans. | Wabash, Ind. |
| Altoona, Pa. | Evanston, Ills. | La Crosse, Wis. | Pittsburgh, Pa. (2) | Waco, Texas. |
| Anderson, Ind. | Eufaula, Ala. | Lebanon, Ind. | Plainfield, Ind. | Waukesha, Wis. |
| Bellaire, Ohio. | Frankfort, Ind. | Lima, Ohio. | Portage City, Wis. | Wheeling, West Va. |
| Birmingham, Ala. | Freeport, Ills. | Logan, Ohio. | Sedalia, Mo. | Wellington, Kans. |
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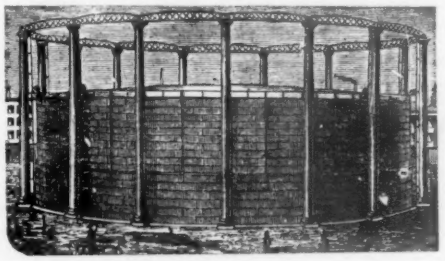

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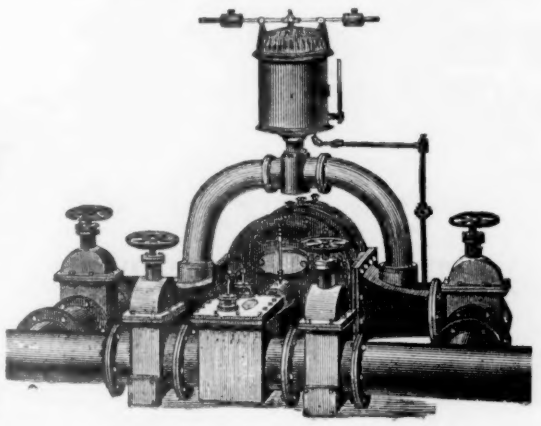

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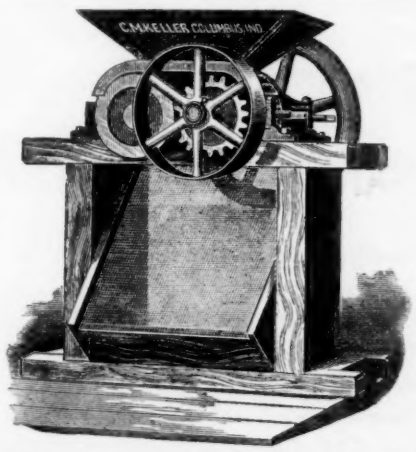


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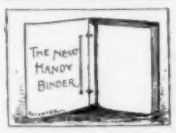


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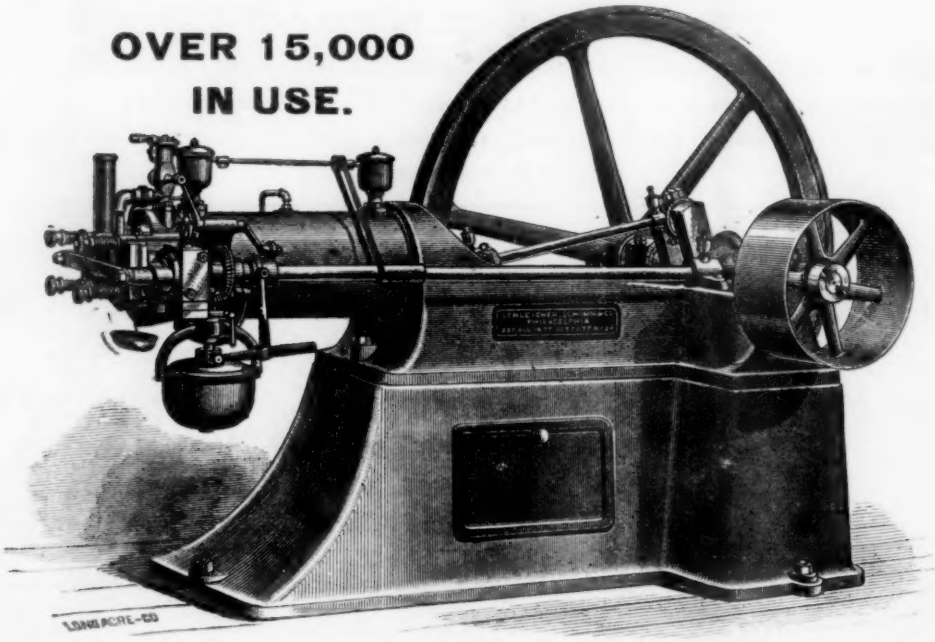

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